CRAFTING THE DIGITAL

A POSTPHENOMENOLOGICAL INVESTIGATION INTO THE HUMAN-TECHNOLOGY INTERFACE IN A CONTEMPORARY JEWELLERY PRAXIS

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This thesis is presented in partial fulfilment of the requirements for the degree of Masters in Visual Arts in the Faculty of Arts and Social Sciences at Stellenbosch University

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December 2021

Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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Abstract

This study explores the boundaries of technological tools in relation to the human body through my own process of jewellery production. It asserts the role of the jewellery piece, as an embodiment of myself, the artist (through my physical involvement in the production of each piece that I create) and the technologies that I rely on. The jewellery piece itself serves as the physical artefact that could potentially distort the human body by way of transforming and extending it. In the same way that technological tools can mediate the human experience in terms of making, I draw a comparison between technological mediation in human experience and the way in which a jewellery piece becomes a physical extension of the wearer and possibly an extension of the human body.

I investigate how postphenomenological interpretations of the interface between the human and technology can be expressed through contemporary jewellery practices. Considering that postphenomenology recognises technology as a tool that mediates the human experience of reality, I position postphenomenology as a lens through which I unpack my own experience within a contemporary jewellery practice. I specifically investigate the extent to which the relationship between craftsman and tool is inter-connected and/or indistinguishable in my own craft-based jewellery practice. As such, this study is an attempt to unpack the relationship between the human and technology during the process of making. Furthermore, I establish the role of technology and contemporary jewellery as a form of prosthesis, by framing both the jewellery piece and the technologies used to make it as devices that have the potential to transform the state of the human body. Considering the transformative properties of technology within a posthumanist discourse, I unpack the posthuman as a state of being which is directly influenced by the technological artefact. Thus, posthumanist discourse becomes a platform which allows me to explore, through contemporary jewellery, the role of technology and digitization in obscuring the boundaries of the human body.

Opsomming

In hierdie studie ondersoek ek die invloed wat tegnologiese instrumente kan hê op die beweerde grense van die menslike liggaam, soos bewerkstellig binne my eie kunspraktyk as kuns-juwelier. Ek ondersoek die rol van juweliersware as die vergestalting van myself, die kunstenaar (deur my fisieke betrokkenheid by die vervaardiging van elke stuk) sowel as die tegnologieë waarop ek staat maak. Die juweliersware self dien as die fisiese artefak wat die grense van die menslike liggaam kan beïnvloed, in die sin dat die juweelstuk moontlik gesien kan word as ‘n uitbreiding van die menslike liggaam en so doende die grense van die menslike liggaam kan transformeer of bevraagteken. Op dieselfde manier kan menslike interaksies met tegnologiese instrumente ook gesien word as ‘n moontlike uitbreiding (of verlenging) van die menslike liggaam. Sodoende kan beide die tegnologie wat ek gebruik om juwele mee te vervaardig, sowel as die juweelstuk self beskou word as 'n moontlike uitbreiding van die menslike liggaam.

Verder ondersoek ek hoe kuns-juweliers praktyke, post-fenomenologiese interpretasies van die koppelvlak; tussen mens en tegnologie, kan uitbeeld. As sulks posisioneer ek hierdie studie binne ‘n post-fenomenologiese raamwerk, waarbinne ek my eie vervaardigingsprosesse ontleed. Ek ondersoek spesifiek tot water mate die verhouding tussen vakman en werktuig onderling verbind is en / of ononderskeibaar kan wees binne my eie juweliers praktyk. Ek sien dus hierdie studie as 'n wyse om die verhouding tussen mens en tegnologie, tydens die vervaardigingsproses, te ontleed. Deur hierdie ondersoek word verdere vrae rondom die rol van tegnologie en juweliersware as ‘n moontlike vorm van prostese aangewakker, en as sulks ondersoek ek beide die juweelstuk self, sowel as die tegnologie wat ek gebruik om dit mee te skep, as onderskeidelike vorms van prostese.

In hierdie studie ondersoek ek dus die wyse waarop, beide tegnologie en juweliersware onderskeidelik, die natuurlike toestand van die menslike liggaam kan transformeer. As sulks ondersoek ek binne ‘n posthumanistiese diskoers, die post-menslike, as 'n toestand van wese wat direk beïnvloed word deur die tegnologiese artefak. Die rol van tegnologie en digitalisering binne 'n posthumanistiese diskoers word dus 'n platform om kuns-juweliersware te verken as 'n instrument wat die grense van die post-menslike liggaam kan vervaag.

Acknowledgements

I want to thank my supervisor Joani Groenewald for your unwavering encouragement and support. I am especially grateful for your friendship and your infectious tenacity for life. To my colleagues and friends within the faculty, thank you for your enthusiasm and your interest in my work.

To my husband Francois Oberholzer, I am exceptionally grateful for your steadfast love, support and fervour for my work. Thank you for being my rock and encouraging me to seize this opportunity.

To my mother Chantelle, thank you for your intercession and unconditional love.

כל התהילה והכבוד ליהוה, כי בלעדיו זה לא יהיה אפשרי.

To my stepfather Frans, words cannot describe my appreciation for your emotional and financial support as well as your keen interest in my work.

To my father Beyers, thank you for continuously reminding me to seek my voice, find my passion, and live my truth.

To my friends and family, thank you for the endless encouragement and support.

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We become constituted through making and using technologies that shape our minds and extend our bodies.
We make things which in turn make us.
(Ihde & Malafouris 2018: 195).

Preface

My interest in this investigation into the human-technology interface within a contemporary jewellery practice stems from a place of curiosity and frustration. During 2016 to 2018 I worked as junior computer-aided designer in a factory that mass produced fine jewellery[1] for a large commercial corporation in South Africa. I rendered myself as a mere cog in a corporate machine that limited creativity and praised productivity. Although I had spent hours succumbing to the commercially-driven mindset of industrialised jewellery design, I had more importantly accumulated an incredible amount of technical knowledge in both the intricacies of mass-production processes, and of 3D printing and modelling. Towards the end of 2018 I decided to apply for my Master's in Visual Arts, leaving the automatized production cycle that had become so intertwined with my every-day life. During this time I had also begun to teach computer-aided design (CAD) to third and fourth year jewellery design students.

Shifting away from my commercially engrained mindset proved to be rather difficult because, I would argue, my creativity had lain dormant for quite some time. By exploring various design techniques during the beginning stages of my studies, I quickly realised that I was struggling to return to an 'analogue' version of design as my understanding of design and manufacturing had been completely transformed through three-dimensional design. I found that I would design larger content using computer-aided design software than I would design in an hour by hand. In an effort to 'escape' the digital tools I had become so acquainted with, I sought out various traditional craft-based practices, which I hoped would revive or somehow restore my creative capacity as a craftsman. However, this only steered me back into the former digital direction, within which I had become so intertwined. Though this process I realised that my confidence was embedded within the digital tools that I use, such as computer-aided design (CAD) and three-dimensional printing, whilst the analogue version of my jewellery praxis had become increasingly intimidating for me. My approach to the design and production of my pieces was rooted mostly in the virtual world of digital tools, while as a craftsman I still felt drawn to create and 'make' with my own hands.

This need to create by hand, through tangible interactions between my body and my materials, and the comfort (or ease) I experience whilst working within a digital realm have been the driving force behind this investigation. It is this feeling of push-and-pull that has prompted my desire to investigate the relationship between myself – the craftsman – and various technologies, as well as the arguable dependence that has emerged in me on these technologies. In this regard I seek to explore the human-technology interfaces within my jewellery practice. I consider traditional techniques and tools as the foundations from which digital techniques and tools originated and developed. As such I argue that there is a co-dependent, reciprocal relationship between traditional (analogue) and digital tools and that they inherently influence one another. Furthermore, I regard technology as a product of

[1] Fine Jewellery refers to a field of jewellery typically associated with commercialized jewellery. Fine jewellery is usually decorative in form and consists of precious materials. Typically, this category of jewellery is made of gold, sterling silver or platinum, amongst other precious metals, and often incorporates precious gemstones.

human invention and I base this understanding on the premise that humans develop new technological devices that are informed by their understanding of various existing manual tools. In this regard, the human agent informs the construction of technology, but the technology has in turn informed the human body, human interaction and various human actions in a postmodern[2] era.

[2] Postmodernism refers to the late 20th century aesthetic movement, marking a departure from modernist thinking through challenging grand narratives, an insistence on stability and ultimate truths. It promotes fluidity in meaning and a sense of multiplicity (Hutcheon in Wake 2006: 18 -120). When referencing the postmodern era within my study, I refer to my current reality in the year 2020. I acknowledge the era I live in to be 'postmodern' and therefore postmodern characteristics are direct influences in my own life. I am personally faced with the reality of what Linda Hutcheon states to be "multiple truths" in this era (Hutcheon in Wake 2006: 119.) This is evident in the way that I approach this study as well as my acknowledgement of the ambiguity around selfhood or the subject (myself). I fully embrace Hutcheon's notion that the human subject is fluid and that human experience is fully subjective (Hutcheon in Wake 2006: 120).

Introduction

In this study I explore how my own creative practice as contemporary jeweller[3] can challenge the boundaries of the human body during technologically mediated production processes. In this regard, I specifically investigate the boundaries of my own body in relation to the technologies that I rely on from a postphenomenological perspective.[4] This investigation has taken shape within my contemporary jewellery praxis in the sense that I explore the human-technology interface[5] in relation to the artisan (myself) during the process of making jewellery. As a jewellery designer who often relies on digital[6] tools such as computer-aided design (CAD) software to produce the jewellery pieces that I create, this human-technology interface seems particularly pertinent, and has led me to investigate the relationship that humans have developed with certain technological tools.[7] By applying a posthumanist[8] perspective, I investigate my own interaction with various technological tools, reinforcing the perspective that, in an ever-increasingly technologically mediated world, the boundaries between humans and technology are becoming increasingly obscured. I question the state of the human body within the context of technogenesis,[9] investigating the degree to which technology may influence my experience within the process of making jewellery.

[3] Contemporary Jewellery is understood as jewellery that originated during the 1950s in response to the commercial jewellery industry. An emphasis was placed on the value of jewellery and the materials used in production. As a result, alternative materials became popular within contemporary jewellery manufacturing. The focus shifted away from wearability and more often than not encouraged the body to be positioned within a conceptual framework (Dormer and Turner, 1994: 7-14). Additionally, contemporary Jewellery can be considered a fusion of art and craft, "jewellery that obscures the relationship between form and function" (Zhang 2016: n.p); a medium that destabilises conventional thinking through the materials and conceptual properties, raising questions on form and function (Zhang 2016: 7). It is a powerful medium that can be utilised in confronting certain discourses, while transforming the human body into a "conceptual arena" (Zellweger, 2008 10). In its interaction with the body, contemporary jewellery is loaded with symbolism and becomes inherently performative while worn on the body (Interview: Christoph Zellweger, 2017). Thus, contemporary Jewellery and the human body become somewhat intertwined, as it becomes a platform for "unpacking bodily discourse and the workings thereof in a specifically social context" (van Niekerk 2019: 32).

[4] Such a perspective suggests that human experience and understanding are shaped through our interactions with our environment just as much as our environment is shaped by our interactions with it (be these experiences physical or technologically mediated). Such a perspective suggests that humans, the natural world and technology operate co-constructively, each informing and shaping one another in a non-hierarchical system of exchange.

[5] In the book *Design, mediation, and the posthuman* (2014), editors Dennis Weiss, Amy Propen and Colbey Emmerson Reid introduce the interface as representing an "insurmountable topological space which exists between the human, and the technological artifact that the human manipulates" (Miccoli in Weiss, Propen and Reid 2014: 1). In this study I use the term 'interface' to refer to the relationship between human and technology. It symbolises the point where the human and the technological interact, meet, exchange, or to put it plainly – the relationship between human and technology (Weiss, Propen and Reid 2014: 1). Additionally, I consider the interface to represent a transformative space where technology and the human exchange components of themselves, abstracting the original state of either the human body or the technological artefact (Hayles 1999: 290). Throughout my investigation I refer to four categories of the interface: A) The human-technology interface or simply the 'interface' refers to the generalised relationship that humans have with technology; B) The '*interface'* specifically refers to my own interface and the relationship that I share with technology in my contemporary jewellery practice; C) The 'digital *interface'* refers to the relationship I have with various digital tools, such as CAD, my computer, my 3D printer etc.; D) The 'nondigital *interface'* refers to the relationship I have with my nondigital tools such as my hammer, saw, crucible, files etc.

[6] Digital craft is a term that I use in my study to refer to any craft-based practices that require or entail digital software and tools. These may include computer-aided design, three-dimensional printing, three-dimensional scanning and CNC milling, to name a few.

[7] These technologies consist of digital tools (such as digital 3D design software) and nondigital tools (such as my hammer and saw) and I consider them as physical and digital extensions of my own body, enabling me to make within a contemporary jewellery practice.

[8] The posthumanist perspective refers to the view that the human body and machines are "seamlessly articulated, mutually dependent, and co-evolving" (Nayar 2014 :8). This view reconstructs human subjectivity, positioning it as a hybrid of human, machine, and animal, co-evolving. Thus, the posthuman can be regarded as a 'dynamic hybrid', formed through the exchange between humans and their environment (Nayar 2014: 8-9).

[9] Technogenesis refers to the process of humans and technology co-evolving throughout history. According to Katherine Hayles technogenesis is "the idea that humans and technics have co-evolved together" (Hayles 2012: 10) Within my research I regard technogenesis as an informative process that has shaped my current tool engagement as well as the exploration of adapted tools and materials. Additionally, I position the process of technogenesis at the foreground of technological development and more importantly as the point of departure for my own engagement with my tools.

I am particularly intrigued by the nature of my own creative practice[10] in relation to notions of prosthesis[11] within a posthumanist context. In this respect I regard posthumanism[12] as a state of being that I, as the artisan, enter into during the process of making jewellery. I view the technologically mediated state of production where my body intersects with technology as the *interface.* It is important to note that I will refer to the term *interface*[13] throughout this study in order to describe a specific state of making, one that is mediated by and that necessitates the presence of another technology, the nature of which may vary, depending on the production process at hand. I regard my interactions with the *interface* as the space where I can investigate my own bodily boundaries in relation to technology (within a contemporary jewellery praxis). By extension I explore the role of my technological tools and my interactions with such tools at this *interface* as possible forms of prosthesis that enable me to enter into a posthuman state. In other words, I explore the *interface* as a platform that is conducive to creating such a posthumanist state of being where the boundaries between myself and the technologies that I rely on are increasingly obscured.

Furthermore, my investigation is conducted as practice-based research (PBR),[14] in the sense that the jewellery pieces that I create and the process of making are catalysts for my theoretical investigation and vice versa. My body as the artist and maker, and the technologies that I rely on, are the subject matter I interrogate during this study, questioning the relationship and bodily boundaries between the artist and her tools[15] during the process of

[10] Throughout my investigation I refer to my contemporary Jewellery practice and my creative process. It is important to note that when I refer to either of these practices, they embody the same process. Both my contemporary jewellery practice and my creative process encapsulate the process of design, form exploration, and manufacturing.

[11] When discussing prosthesis in relation to the posthuman, I draw on Helen de Preester's (2011: 119 -137) writings on the role of technologizing the self. De Preester connects the role of prosthesis within re-embodiment, and links it back to the human's experience of the world in relation to the prosthetic (de Preester 2011: 119 – 137). In relation to my own body, I recognize the technologies I collaborate with as form of prosthesis and by extension I consider the jewellery pieces that I make to be prosthetic in nature. I address the notion of the prosthetic and the way in which foreign objects – in their collaboration with the body – can be regarded as an extension of the body both literally and metaphorically. Although the prosthetic is often used as a general conjecture to explain the ways in which the body interacts with technology, "both the prosthesis and the body are generalised in a form that denies how bodies can and do take up technologies of all kinds" (Soobchack in Smith and Morra 2007: 20). When discussing prosthesis in relation to the transhuman, I draw on Helen de Preester's writings on the role of technologizing the self. De Preester links the role of prosthesis within re-embodiment, and links it back to the human's experience of the world in relation to the prosthetic (de Preester 2011: 119 – 137). In relation to my own body, I recognize the technologies I collaborate with as form of prosthesis and consider some of the jewellery pieces that I make to be considered prosthetic as well.

[12] Throughout my research I refer to the posthuman/posthuman state as a construct that is informed by technological mediation in relation to the human body. According to Katherine Hayles, posthumanism does not entail departing from the human body but rather extending embodied awareness through prosthesis (Hayles 1999:290 -291). In this investigation I view the posthuman as a construct informed by posthumanist thought. It is an altered state of being and an extension of the organic human being. I aim to introduce the posthuman state as a transformative space that consists of a hybrid comprising the organic human body and technology. Thus, the posthuman refers to the transformative state of the human body in relation to technology, in the sense that technology intertwines with the human body during the process of technological engagement. Furthermore, I engage with the posthuman within the *interface* as I make jewellery pieces. It is important to note that the posthuman in relation to this study is distinguishable from the cyborg, in the sense that the cyborg represents the human body as permanently altered or enhanced by technology, whereas the posthuman represents a figurative state co-constructed through the human-technology interface and that can be engaged at will through human interaction with technology. I explain this differentiation in further detail within my theoretical framework.

[13] In this regard I refer to the *interface* as a platform where my body intersects with another technology during the process of making. As such the interface embodies a specific state of making that is mediated through and that necessitates the presence of another technology.

[14] My research consists of two components, practical and theoretical. These two components are mutually informative and work together to form the output of this thesis. The practical part of this thesis consists of various jewellery pieces, sculptures, virtual projections, and objects which embody and illustrate the research discussed throughout this thesis. This is otherwise known as practice-based research as the two continuously inform each other. (For more information regarding practice-based research see page 15.)

[15] It is important to note that in my research I acknowledge tools and technology as inseparable entities. Therefore, throughout my research when I refer to technology this includes both traditional analogue tools and modern digital platforms. In this regard, technology becomes the umbrella under which various forms of tools reside. I also challenge the boundaries of the tool as a separate entity or object and as such do not limit it to inanimate objects per se, but rather suggest that the subject (e.g. the human body) can also be identified as a tool.

making. Thus, to fully unpack the influence of technology on my body during the process of making,[16] my investigation revolves around my own experience[17] and my interaction with technology as I explore both nondigital and digital processes within my contemporary jewellery practice.

I begin my investigation by underlining the role of technogenesis within the current digital landscape.[18] Considering the co-evolution of human and technology, I discuss the ways in which craft[19] and various craft-based tools[20] have transformed through the process of technogenesis. Within my own craft practice I position myself as the industrial artisan[21] who is directly affected by the impacts of technogenesis. I regard contemporary jewellery as a discipline within the framework of modern craft practices (Adamson 2010:43 -47). Drawing on the notion of re-tooling,[22] I analyse my own engagement with my tools within the process of designing and manufacturing contemporary jewellery, reflecting on the various nondigital and digital *interfaces* within my practice. I analyse the partnership with certain technologies that I rely on during the process of production and the ways in which my tools mediate my experience of my environment and self. I explore tool mediation,[23] which incorporates the way that technology

[16] My experience refers to the process of making within a contemporary jewellery praxis through means of production and in collaboration with various materials to create form.

[17] It is important to mention this study adopts a qualitive research approach in that my investigation is concerned with gaining an understanding of the experience and meaning of human lives and their corresponding environments. According to Sharan Merriam, "the key to understanding qualitive research lies with the idea that meaning is socially constructed by individuals in interaction with their world" (Merriam 2002: 3). Merriam suggests that a human's interpretation of reality is not fixed, but rather in a state of flux, changing over time. By unpacking these interpretations one can learn "how individuals experience and interact with their social world, the meaning it has for them" (Merriam 2002: 4). Although my investigation is conducted within the context of practice-based research, I recognize that it is qualitive as well. Throughout my research I specifically draw on my own (subjective) experience by collecting information relating to my constructed reality. Thus, qualitive research underlies my postphenomenological investigation into my own human-technology *interface*.

[18] The digital landscape refers to the world in the current fourth industrial revolution. According to Klaus Schwab, "the fourth industrial revolution creates a world in which virtual and physical systems of manufacturing globally cooperate with each other in a flexible way" (Schwab 2016:12). In the context of this study, I refer to the digital landscape as the space mediated by the objects produced from the matrix of the fourth industrial revolution. I consider my digital tools and the digital *interface* as products of the fourth industrial revolution. These digitalised tools alter the way in which humans relate to their environment, as they render a digital landscape.

[19] Craft stems from the Greek word 'techne' which encompasses "the skill and know-how" of making. Henry Slaten in his book *Techne Theory: A New Language for Art* (2019), describes techne as "the cunning that organizes materials, methods and the artisans' actions in the most effective way" (Slaten 2019: n.p.). Techne can therefore include "the arts of fishing, carpentry, generalship, mathematics – all forms of skilful attaining of a goal" (Slaten 2019: n.p.). Slaten goes on to say that techne embodies a human's practical intelligence, which encompasses the human's ability to "organise materials, objects and situations into coherent well-formed things". Techne therefore becomes a base for understanding craft in relation to practice, through defining the human's ability or skill. In terms of making, this defines the craftsman's ability to create or generate an object through applying skills in combination with a tool.

[20] Craft-based tools cover a variety of tools that are used in the process of making. These tools include but are not limited to pottery tools, woodworking tools and metalsmithing tools, to name a few. This term can be regarded as a generalisation of craft tools; however, throughout my investigation I differentiate between digital and nondigital tools and this is relevant to craft-based tools as well, in the sense that contemporary craft-based practices include various digital and nondigital tools. For example: in the craft of pottery there are many nondigital tools such as the potter's rib, cutters and various shaping tools. Then there is the potter's wheel, which can consist of a manual or automated process of throwing clay vessels. However, within the current digital landscape ceramicists also have the ability to 3D model their designs and later 3D print these models directly into clay using a specialised 3D printer. Therefore I consider craft-based tools to include both digital and nondigital tools used within the process of making.

[21] The 'industrial artisan' is a term introduced by Glenn Adamson in his book *Craft Reader* (2010). Adamson defines the industrial artisan as the modern craftsman in the context of the industrial revolution (Adamson 2010: 43-47). Considering the technogenetic transformations that my tools and I myself have undergone within my own contemporary jewellery practice, I am confronted with the notion of the industrial artisan. Throughout my investigation I position myself as a contemporary jewellery designer, but I consider myself to be an industrial artisan as well. Drawing on Adamson's definition of the modern craftsman, I align myself with this term within my own jewellery-making practice.

[22] Re-tooling refers to the process in which certain tools have evolved, adapted and been transformed. According to Emily Zilber, re-tooling signifies a process in which tools become immersed in a "state of perpetual flux between past traditions and future innovations" (Zilber 2015: 11). In my investigation, I position re-tooling as a product of technogenesis and a process of transforming one's tools. This can be done through changing the function of an existing tool, transforming a nondigital tool into a digital tool, or even defunctionalizing a tool.

[23] Technological mediation in this study refers to the way in which technology can influence or affect the human body's experience and interaction with his/her environment (Verbeek 2005: 11). Peter-Paul Verbeek explains mediation theory (in terms of the philosophy of technology) as being mainly concerned with

can influence our understanding and interactions of the world, within the framework of phenomenology.[24] In this regard phenomenology suggests that "things" (Thomas 2006: 43) mediate a human's environment, as well as their understanding of reality. However, considering that this investigation is centred on the human-technology interface, I apply a postphenomenological[25] perspective in analysing my own *interface,* in the sense that postphenomenology also suggests that a human's environment, as well as their understanding of reality, is mediated and transformed by technology.

By applying a postphenomenological perspective I introduce the *interface* as a transformative space within my investigation. In the context of this study the human-technology interface represents a space where human and technology intersect, interact and exchange fragments of themselves (Miccoli in Weiss, Propen & Reid 2014: 1). Thus, I introduce various classifications of the interface within my discussion, as I differentiate between the human-technology interface,[26] my own *interface,*[27] digital interfaces[28] and nondigital interfaces.[29] I explore the process of making contemporary jewellery within the spheres of both a digital and nondigital *interface.* I consider my tools (digital and nondigital) as a challenge to my bodily boundaries through their ability to extend, alter and possibly transform my body's physical and cognitive abilities. I recognise the digital tools that I use (such as CAD) as a virtual extension of my human body, and the nondigital tools (such as my hammer and saw) to be physical extensions of my human body. Therefore I frame my tools, both digital and nondigital, as prosthetic devices that extend my body's natural capabilities. In addition to the tools I use in my contemporary jewellery practice, I consider the notion that contemporary jewellery (through its ability to extend and alter the body) could be identified as a technological device as well. In this light, the contemporary jewellery pieces that I manufacture can be regarded as a by-product of my collaboration with technology within my practice. Additionally, my jewellery pieces serve to illustrate and embody the *interface*. Therefore, contemporary jewellery can be regarded as a medium that enables

understanding the way in which technology can mediate a human being's experience and practices (Verbeek 2016: 189 -204). In my research I employ mediation theory (which I use in conjunction to postphenomenology) in order to analyse the relationship between the human and technology. I apply Peter-Paul Verbeek's principles and draw on Don Ihde's philosophy of technology, and specifically their definition of technological mediation in relation to material engagement. Mediation theory and postphenomenology together become the framework and the lens through which I conduct my own research.

[24] Phenomenology can be regarded as a philosophy through which one can study the structure of consciousness and the human experience of "things" (Thomas 2006: 43). According to Julian Thomas, phenomenology is "a methodology in which the investigator bases their interpretation of a place or object upon their unbridled subjective experience" (Thomas 2006: 43). In other words, phenomenology is a process in which an individual becomes more aware of the self through certain subjective experiences and the meaning attached to certain things/objects within these experiences.

[25] In order to conceptualise my own technological interaction during the process of making, I draw on Don Ihde's and Peter-Paul Verbeek's theories on postphenomenology. In basic terms, postphenomenology can be understood as the philosophy of technology. Similar to mediation theory, it provides a framework through which one can understand the relationship between the human and technology (Verbeek 2015: 9 -11). This in turn allows me to look at how my experience of making can be shaped through the technology I use. Applying Don Ihde's theories around postphenomenology and Peter-Paul Verbreek's meditation theory as the lenses through which I view my research, enables me to unpack the complex qualities of the relationship between the human and technology. Postphenomenology is explained in more depth in Chapter 3.

[26] The human-technology interface or the interface refers to the generalised relationship that humans have with technology. This can be regarded as an overarching term for the various interfaces that exist between the human and technology.

[27] The *interface* specifically refers to my own interface and the relationship that I share with technology in my contemporary Jewellery practice. This can consist of various digital or nondigital *interfaces* such as the relationship I have with 3D modelling software (digital) and the physical action or analogue process of making jewellery by hand (nondigital).

[28] The digital *interface* refers to the relationship between myself and various digital tools, such as 3D modelling software, a computer, a 3D printer etc.

[29] The nondigital *interface* refers to the relationship I have with my nondigital tools such as my hammer, saw, crucible, files etc.

me to unpack the experiences of my own reality through technology, and the way in which technology mediates my experience of making jewellery.

Furthermore, I describe posthumanism as a worldview which suggests the co-evolution and co-construction of the human and the prosthetic. I place my body within a posthumanist context, in the sense that the process of making jewellery and the act of wearing jewellery enables a co-evolution of myself alongside my tools and the jewellery pieces that I create. I further discuss posthumanist thought in relation to the human body and the ways in which it informs transhumanism,[30] with the implication that transhumanism focuses on transcending the human body's limitations through the evolution, and ultimately the perfection, of the human body (Nayar 2014 :6). Considering the ways in which posthumanism informs transhumanist thought, I introduce the posthuman state and the notion of the cyborg[31] as a co-construction of human and prosthetic (Hayles 1999:2-3), framing the *interface* as the transformative space in which the human body transcends itself to become a cyborg or shift into a posthuman state. Therefore, the role of technology as prosthesis is key to the construction of the cyborg as well as engaging with the posthuman state (Hayles 1999:2). Although the cyborg is considered a posthuman subject that is comprised of human and machine (Bolter 2016:2), in my investigation I place the cyborg within a transhumanist context, in the sense that the cyborg views the human as an "autonomous agent, separate from though still engaged with nature" (Bolter 2016:1). This view draws on aspects of traditional Western humanism,[32] which contradicts the defining traits of posthumanism with the implication that posthumanism rejects traditional humanist boundaries and establishes a co-evolution between humans, the environment, animals and technology. Therefore, I introduce the posthuman as a state that the human body can enter into within a human-technology interface. In relation to this, I position myself as an industrial artisan who engages with the posthuman state during the process of making contemporary jewellery. But it is important to note that I regard the posthuman state – in my practice – as separate from the notion of the cyborg, which can be associated with transhumanism. To a greater extent I consider the posthuman state as dependent on my interaction with the *interface.* In this regard, I unpack the boundaries between the prosthetic and the body through an exploration of my own *interface* within a contemporary jewellery praxis.

[30] Transhumanism can easily be confused with posthumanism, as both ideas reside within posthumanist thought. According to Francesca Ferrando, transhumanism complicates the current understanding of the human through "possibilities inscribed within its possible biological and technological evolutions" (Ferrando 2013:27). She goes on to explain that the enhancement of humans is key to transhumanism and that this enhancement is accessed through technological and scientific transformations (Ferrando 2013:27). Central to transhumanism "is a view of man as an autonomous agent, separate from though still engaged with nature" (Bolter 2016: 1), which draws on aspects embedded within a humanist view.

[31] The cyborg is a term I use to reference a transhuman state in which the human body transcends into a hybrid of human and machine. According to Jay David Bolter, the cyborg (as introduced by Donna Harraway) is a 'contemporary cultural metaphor' that captures "the ambivalent condition of the contemporary human beings, whose bodies are open to forms of technological modification and intervention" (Bolter 2016: 2)

[32] Humanism refers to the study of the human subject and the features that comprise the human. By positioning the human subject as central within the world, humanism establishes that "the essence of the human lies in the rational mind, or soul" (Nayar 2014: 4-5).

Aims and Objectives

The main focus of my research investigation is formulated in the following question:

> Could the process of making contemporary jewellery render a comprehensive understanding of bodily boundaries at the human-technology interface?

The following sub-questions inform each chapter in my thesis, as I unpack various aspects of my investigation:

1. To what degree does technogenesis inform the human-technology interface, and what is its role in the construction of the industrial artisan?
2. What is the role of postphenomenology in analysing technological mediation at the human-technology interface?
3. To what extent could contemporary jewellery illustrate and embody the intangible effects of the human-technology interface?
4. Could the human-technology interface represent aspects of the posthuman state, and to what degree does the prosthetic device influence this?

This thesis serves as the theoretical component of my postphenomenological investigation into the human-technology interface. I conduct my investigation within a contemporary jewellery praxis, unpacking my role as an artisan in relation to the technology I use. By analysing the effects of technogenesis within my own creative practice, I consider the ways technology mediates my experience within the process of making. I discuss the way I engage with my tools in the process of making contemporary jewellery, whilst positioning myself as an industrial artisan within a digital landscape. I engage with the process of making contemporary jewellery to unpack posthuman traits of the human-technology *interface*. Therefore, the jewellery pieces that I make are not only a by-product of my investigation, but also embody the transformative nature of the *interface* in that each piece becomes an embodiment of the posthuman state.

Research Methodology

In this study, I employ a practice-based research (PBR) methodology to investigate the relationship between my jewellery practice and the theoretical concerns that inform my practice. Practice-based research thus forms an integral part of my research process, as the contemporary jewellery devices that I create embody the research findings of my theoretical investigation and vice versa. Linda Candy describes practice-based research as "an investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice" (Candy 2006: 3). My contemporary jewellery practice informs my investigation into the human-technology *interface,* situating this study within the broader framework of qualitative research. According to Sharan Merriam, "the key to understanding qualitative research lies with the idea that meaning is socially constructed by individuals in interaction with their world" (Merriam 2002:3). Thus, "there are multiple constructions and interpretations of reality that are in flux and change over time" (Merriam 2002: 3-4). Consequently, this study is situated within the framework of qualitative research, in the sense that it is focused on the interpretations that I formulate through my interactions with my environment during the process of making contemporary jewellery. The outcomes of this study will therefore be based on my own understanding of the world and will be described through the use of language and text. In applying a postphenomenological (and partially phenomenological) investigation to my contemporary jewellery practice, I draw on themes central in qualitative research, in the sense that I unpack my experiences of technology during the process of making jewellery, which informs my understanding of the human-technology *interface*. Therefore, the aspects of qualitative research within my research can be associated with the postphenomenological perspective that is applied during my investigation.

In my praxis I choose to work with both digital and nondigital tools, both of which inform my understanding of the human-technology *interface* in a contemporary jewellery practice. I specifically rely on my jewellery praxis to explore the technological evolution of tools in relation to the development of the human subject. It is also important to note this study's relation to object-orientated ontology (OOO), a term coined by Graham Harman, who explains OOO as an ontology closely related to phenomenology in which the object possesses agency (Harman 2015: 401-402). Neil Leach draws on Harman's discussion of OOO, stating that our understanding in accommodating the tool, and the ability to think by using the tool, renders a type of prosthesis in relation to the body (Leach 2016:346). According to Leach, humans "appropriate technology and tools, and tend to absorb technology within human consciousness" (Leach 2016: 346). Considering OOO's close relation to phenomenology, I regard objects – which in the context of this study can refer to technology – as having agency, and I consider this agency as having a direct impact on my understanding of bodily boundaries at the various human-technology interfaces in my practice. Furthermore, I focus on the phenomenological aspects of the objects that I engage with, and more specifically the postphenomenological aspects of technology, to inform my investigation of the human-technology *interface.* Therefore OOO, along with qualitative research, can be regarded as informing my postphenomenological investigation.

Moreover, the process of making informs my understanding of tools, as I locate various boundaries in my human-technology *interface.* I approach the *interface* within a postphenomenological context, in the sense that I become aware of the ways in which technology informs my understanding of making. Thus, I regard the *interface* as a transformative space in which my bodily boundaries become indistinguishable. Additionally, the role of technology in the obscuring of boundaries at the *interface* becomes of particular interest in my investigation. The *interface* introduces a posthuman state, in which technology functions as a prosthetic device that extends my body's natural and cognitive capabilities. My collaboration with technology in the context of technogenesis unpacks the intangible traits of the posthuman state, in the sense that both myself and the technologies I engage are co-constructed in the *interface.* Therefore, my contemporary jewellery pieces are not only a by-product of my investigation, but formulate the practical component of my theoretical investigation.

To reiterate, my investigation relies on my jewellery praxis in order to unpack the artisan's (my) bodily boundaries at the *interface*. In my creative process I engage with nondigital tools such as metalsmithing, crochet and pottery, and then combine them with various digital tools such as computer-aided design, 3D printing and 3D scanning. My collaboration with these technologies becomes a point of departure for my investigation of the *interface*. Therefore, this practice-driven process enables me to explore and gain further insight into the boundaries at the *interface*. By analysing my own engagement with tools in my contemporary jewellery practice alongside the development of existing tools, I contemplate the role of technogenesis as of vital importance in craft practices considering that technologies continue to adapt to the environment. In this regard technological breakthroughs in engineering and design are not necessarily intended to eliminate nondigital tools, but rather to improve the existing tools through various developments (Adamson 2010: 43). In my practice I apply this same approach, as my design and making processes move between utilising both nondigital and digital tools, continuously adapting and transforming.

My contemporary jewellery pieces therefore become an illustration of my research, serving as devices that are considered technological objects, while also becoming an ambiguous embodiment of the human-technology *interface*, the prosthetic and the posthuman state. My pieces thus not only serve as a practical component to supplement this thesis, but also as a contribution to the field of contemporary jewellery as a critical research methodology. I frame contemporary jewellery as a methodology that operates within a practice-based methodology, in the sense that the process of making contemporary jewellery enables me to unpack my own bodily boundaries in relation to technology during the process of making. Alongside my own work, I will also discuss the work of several selected contemporary jewellery designers and artists who grapple with similar complex ideologies. Their work serves as further examples in medium, concept and technique that indirectly relate to my own research.

Theoretical framework

To develop the theoretical framework for this study, I outline four key concepts that mutually inform one another, and essentially establish the cornerstones of my investigation:

a) The process of technogenesis
b) Postphenomenology
c) Contemporary jewellery as a methodology
d) Posthumanism.

The enquiry into the co-evolution of human and technology – otherwise known as technogenesis – forms the foundation of my investigation, while I position postphenomenology as an investigative lens within my contemporary jewellery practice. By unpacking the *interface* as a transformative space in my investigation, I become increasingly aware of this space during the process of making. Therefore, contemporary jewellery is the method of inquiry into the human-technology interface, as I establish the role of technology as prosthetic devices in my practice. The action of making contemporary jewellery becomes a process that unpacks bodily boundaries within a human-technology interface. In relation to the *interface,* the notion of the prosthetic suggests a physical and virtual transformation of the human body, which translates into what I consider to be the posthuman state. In my investigation I introduce the posthuman state as a co-construction of human and technology, in which the organic human body and technology begin to interact within the *interface*. Posthumanism becomes the framework, in which the posthuman state is a positioned as a figurative state of being informed by posthumanist thought.

In establishing the foundation for my investigation, I draw on Katherine Hayles's discussion on technogenesis, which she defines as "the idea that humans and technics have coevolved together" (Hayles 2012:10). In her book *How we think: digital media and contemporary technogenesis* (2012), Hayles describes technogenesis as a "potent site for constructive intervention in humanities" (Hayles 2012:14) within the current digital landscape. Hayles highlights a 'contemporary technogenesis', stating that the ever-changing nature of technology brings about fundamental changes in human lives. In unpacking the concept of technogenesis, I examine the historical evolution of technology in relation to my own contemporary jewellery practice. This enables me to analyse my own engagement with tools in my practice, while introducing technological mediation as influential in tool evolution. Additionally, I apply this evolution to my own contemporary jewellery practice in examining my own cognitive evolution alongside technology.

Furthermore, I position my investigation as postphenomenological, in that I apply postphenomenology as an investigative lens within my contemporary jewellery practice. Leading into my discussion on postphenomenology, I first introduce phenomenology – as conceptualised by Martin Heidegger – as a philosophy by which one can

study the structure of consciousness and the human experience of "things" (Thomas 2006: 43). In his book *Being and time* (1962), Heidegger suggests that phenomenology should be regarded as a tool that can be used to address the things that present themselves to us. Phenomenology therefore – according to Heidegger – is not just related to the consciousness, but also to the way in which humans can view the world, and becomes a source of intelligence (Heidegger 1962: 51). I align this with the writings of Julian Thomas in *The handbook of material culture* (2006), as I discuss the influence of phenomenology in the human understanding of the self in relation to objects. In my investigation I position the technologies that I engage as objects, making phenomenology a critical tool in understanding my experience of these objects. However, within the context of this study, I regard phenomenology as a philosophy that directly informs postphenomenological thought in that postphenomenology enables me to understand my own experience of my being[33] as mediated by various technologies.

In discussing postphenomenology, I rely on philosophers Don Ihde and Peter-Paul Verbeek and their discourse on the philosophy of technology – otherwise known as postphenomenology. According to Verbeek, Ihde identified the technological area of phenomenology, and so "the phenomenological approach has always occupied an important place in the philosophy of technology" (Verbeek 2001:119 -146). Verbeek explains phenomenology as a "philosophical approach that seeks to overcome the classical, Cartesian dichotomy between subject and object" (Verbeek 2001: 119-146), suggesting that the nature of humans' experiences depend on the ways in which objects are revealed to them. Therefore, "humans and world are inseparably bound to each other and constitute each other in this bondage" (Verbeek 2001: 119-146). Ihde translates this experience of objects, into the human's experience of technological artefacts as he discusses technology's ability to mediate the human experience of the world (Verbeek 2001: 119 -146). In his article "Postphenomenology – again?" (2003), Ihde explains that technology necessitates human embodiment, and thus postphenomenology replaces subjectivity with embodiment (Ihde 2003: 4-11). However, according to Verbeek, in his book *What things do?* (2005), postphenomenology represents a mutual construction in which humans and their world are interrelated (Verbeek 2005: 147). This pertains to the process of technogenesis in that postphenomenological thought suggests an exchange between humans and artefacts, in which artefacts facilitate human experience. In this study I unpack my own mediation with tools by drawing on Ihde's postphenomenology, as well as on the concept of technological mediation, as articulated by Verbeek. Therefore, I apply postphenomenology as an investigative lens through which I unpack the degree to which my tools mediate my experiences during the process of making contemporary jewellery.

In relation to technological mediation, I introduce the role of the prosthetic device, referencing authors Marquard Smith and Joanne Morra. In their book *Prosthetic Impulses* (2007), they discuss the various aspects of prosthesis in relation to the human body. It is important to note that the term prosthetic can refer to a series of binaries such

[33] I use the term 'being' to describe the state of existing, the nature or essence of being a human. According to Heidegger, the term is indefinable, but in terms of this study I aim to give it substance by referring to the physical presence of my body. My being therefore refers to my body, and my state of existence within my environment (Heidegger 1962 :21).

as self/other, global/local, male/female, body/technology, abled/disabled and public/private. In the context of this study, I specifically refer to prosthesis in relation to the body and technology. Alongside my own body, I position technology and the contemporary jewellery pieces that I manufacture as prosthetic devices that mediate my experience while I am manufacturing jewellery. Furthermore, the role of the prosthetic device becomes especially significant at the human-technology *interface*. I consider my own technological mediation to take place at the human-technology *interface*, as both the human and technology undergo a transformative exchange, in the sense that the human body is informed by its exchange with various technologies both physically and cognitively.
I refer to this transformation as the posthuman state, which I describe as an altered state of the human body, facilitated by the workings of the *interface*. In discussing the posthuman state I reference Katherine Hayles' book *How we become posthuman* (1999). Hayles investigates the history of cybernetics, discussing the posthuman that is informed by posthumanist thought, representing a construct in the feedback loop in which the human form is re-envisioned (Hayles 1999:1).

In unpacking posthumanism as the framework of this study, it is important to establish my position in relation to posthumanism, as there is much confusion around posthumanism as a theoretical stance (Bolter 2016:1). Considering that the rejection of traditional Western humanism is central to posthumanism, it is pertinent to this study to clearly define humanism by outlining the distinction between humanism and posthumanism. According to Tony Davies, "humanism is a word with a very complex history and an unusually wide range of possible meanings and contexts" (Davies 1997:2). Davies suggests that humanism has supported the articulation of crucial themes in modernity,[34] which formulates key concepts and discourse in science, philosophy, religion, politics, aesthetics and education (Davies 1997:5). In this regard, "humanism remains ideologically and conceptually central to modern – perhaps even 'postmodern'- concerns" (Davies 1999: 5).

In discussing the concepts central to humanism,[35] I reference Corliss Lamont, author of *The philosophy of humanism* (1997). Lamont outlines twentieth-century humanism as a philosophy informed by science and reason, in which humans create their own destiny and exist independently from nature (Lamont 1997:13). Thus humanism rejects an objective truth, positioning the human as a supreme subjective being (Lamont 1997: 23-24). However "posthumanist theory claims to offer a new epistemology that is not anthropocentric and therefore not centred in Cartesian dualism" (Bolter 2016: 1). Therefore, posthumanism presents a "new way of understanding the human subject in relationship to the natural world" (Bolter 2016: 1).

[34] Modernity refers to a philosophical discourse of which a key component is the notion of progress. It positions the human as "the at-once singular/collective subject of history" (Mouzakitis 2017: Online). According to Anthony Mouzakitis "the development of the idea of progress in modernity was shaped to a certain extent by the combination of medieval eschatology and the emergence of expectations made possible by a host of unprecedented changes in science, and political, economic and social institutions" (Mouzakitis 2017: Online).
[35] I recognise that there are several meanings associated with the term humanism. In the context of this study, I have chosen to focus on the philosophy of humanism.

Like humanism, posthumanism can be regarded as a hypernym including various movements within philosophy. These movements include critical posthumanism, transhumanism, new materialism and antihumanism, to name a few (Ferrando 2013:26). In my investigation I focus my exploration of the *interface* on critical posthumanism and aspects of transhumanism, as I position my study within a posthumanist framework. Additionally, I draw on aspects of transhumanism as I discuss the construction of the cyborg, differentiating between cyborg and the posthuman state. As I discuss posthumanism, I reference Italian author Francesca Ferrando and Professor Jay David Bolter alongside Pramod Nayar and Katherine Hayles. In addition, I draw on the writings of Donna Harraway and Don Ihde to unpack the notion of the cyborg and its function within both posthumanism and transhumanism. According to Ferrando, confusion occurs within the shared space between transhumanism and posthumanism (Ferrando: 2013:26). Although these two philosophies "share a common perspective of the human" (Ferrando: 2013: 27) as being influenced by their environment, posthumanism embodies a distinct rejection of humanism, in contrast to transhumanism which positions the human at the centre of all things (Nayar 2014 :6).

The central objective of critical posthumanism is the view that humans co-evolve and share eco-systems, genetic material and life processes with animals and other life forms, while regarding technology as integral to human identity and not merely as a prosthetic extension. This view entails a rejection of human exceptionalism and human instrumentalism (Nayar 2014:8). Thus, "critical posthumanism calls attention to the ways in which the machine and the organic body and the human and other life forms are now more or less seamlessly articulated, mutually dependent, and co-evolving" (Nayar 2014:8). This definition of posthumanism relates to the characteristics central to the process of technogenesis. Considering that this study positions technogenesis as foundational in the understanding of the human-technology interface, posthumanism is most applicable in unpacking the complexities around bodily boundaries at the *interface.*

Although I do not directly reference the transhuman in my study, it is necessary to discuss the influence of posthumanism within transhumanism, and specifically describe the cyborg. This will distinguish what I render as the posthuman state from the transhumanist creation known as the cyborg. Francesca Ferrando explains transhumanism as problematic in understanding the human, in that it inscribes possible technological and biological evolutions. Therefore, 'human enhancement' is crucial to transhumanism, the main characteristics of which reflect variables within technology and science (Ferrando 2013:27). Pertaining to this is Pramod Nayar's explanation of transhumanism, in which he states that "transhumanists see existing forms of human as an intermediate stage before the arrival of the advanced human form in which bodies and their intelligence might be enhanced for greater utility and purpose" (Nayar 2014:6). Therefore, transhumanism presents an "emphasis on the machination of humans and the humanization of machines" (Nayar 2014:7). In this regard, transhumanism relates strongly to humanist characteristics, in that the human is central to the world and the improvement of the human form could potentially lead to an advanced human form. In my investigation I consider the connection between posthumanism and transhumanism to be intertwined. Although posthumanism and transhumanism share

aspects pertaining to each other, I have concluded that transhumanism is in distinct contrast to the ideas around posthumanism. According to Ferrando, these two perspectives remain connected by their strong association with technogenesis (Ferrando 2013:28). Although they share qualities embedded within technogenesis – specifically the role of technology as a transformative device – the confusion between these two perspectives appears through the ways in which both transhumanism and posthumanism "approach the same subject from different standpoints and theoretical legacies" (Ferrando 2013:29). The principal distinction between posthumanism and transhumanism can be understood as follows: "Posthumanism investigates technology precisely as a mode of revealing" (Ferrando 2013:29) and therefore "posthumanism is a praxis" (2013:29) that informs transhumanist thought. Transhumanism is regarded as a subset theory that resides within the hypernym of posthumanism, and it specifically utilises technology as an object of enhancement (Nayar: 2014:7). Therefore, transhumanism draws on various traits within a posthumanist view, yet it applies alternative methods in its approach to technology.

Throughout my research, I relate to technology specifically through a series of exchanges, in the sense that technology informs my decisions in the process of making jewellery. However, it is important to note that I do not regard technology as a prosthetic enhancement within a transhumanist perspective but rather within a posthumanist perspective. My relationship with technology is informed by a collaboration in which I co-evolve with the technologies I use. I do not position myself above these technologies as I recognise my reliance on the various tools of my practice. Therefore, I unpack my human-technology *interface* within a posthumanist context, drawing on Katherine Hayles's definition of the posthuman as "a coupling with intelligent machines but a coupling so intense and multifaceted that it is no longer possible to distinguish meaningfully between the biological organism and the informational circuits in which the organism is enmeshed" (Hayles in Nayar 2014:7)).

Considering Hayles's definition of the posthuman, I recognise a problematic association that the posthuman has in relation to the cyborg. To expand on their association, I reference Ferrando as she explains the emergence of the cyborg and its relation to posthumanist debate:

> More than a functional tool for obtaining (energy; more sophisticated technology; or even immortality), technology arrives at the posthumanist debate through the mediation of feminism, in particular, through Donna Haraway's cyborg and her dismantling of strict dualisms and boundaries such as the one between human and non-human animals, biological organisms and machines, the physical and the nonphysical realms; and ultimately the boundary between technology and the self. (Ferrando 2013: 28 -29)

In unpacking the cyborg in relation to posthumanism, I draw on Haraway's description of the cyborg. According to Haraway "contemporary science fiction is full of cyborgs – creatures simultaneously animal and machine, who populate worlds ambiguously natural and crafted" (Haraway 1991: 149). Haraway argues in favour of the cyborg, presenting it as a fictional map comprising of humans' "social and bodily reality and as an imaginative resource suggesting some very fruitful couplings" (Haraway 1991:149 -150). Furthermore, she describes the cyborg as "a

cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction" (Haraway 1991: 149). Haraway's definition of the cyborg strongly relates to Hayles' posthuman condition, which presents something of a conundrum. For this reason, it is necessary to clearly define what I regard as the posthuman state.

To explain my understanding of the posthuman I draw on author Jane Bennet's 'thing power'. In Bennet's essay "The force of things: steps toward an ecology of matter" (2004) she discusses the ways in which certain objects become invested with power. Bennet explains that this power contains relational effects, which in turn contain multiple functions that operate in conjunction and entail "the ability to shift or vibrate between different states of being" (Bennet 2004:354). This pertains to object-orientated ontology (OOO) in which objects possess a form of agency. To reiterate Neil Leach's discussion on OOO, in that our understanding in accommodating the tool and the ability to think through using the tool renders a type of prosthesis in relation to the body (Leach 2016:346). I draw a connection between Bennet's discussion on 'thing power' and Leach's discussion on objects as prosthetic in nature to formulate an understanding of the posthuman state. I base my understanding of technology on Leach's discussion in which he suggests that humans "appropriate technology and tools and tend to absorb technology within human consciousness" (Leach 2016: 346). By combining this perspective with Bennet's 'thing power' I argue that humans, with their ability to absorb technology into their consciousness, draw on the 'thing power' embedded within technology. I contend that technology has the ability to transform the human into various states of being. Therefore – in the context of this study – the posthuman can be regarded as a state in which the human body undergoes transformation that is produced through technological mediation within the human-technology *interface.*

Furthermore, I explore the posthuman state throughout my contemporary jewellery praxis, submerging myself within the *interface*, deliberately engaging with technology, while analysing its effects on my cognitive and physical capabilities. I confront my own posthuman self in relation to the technologies I engage with in my contemporary jewellery practice. The outcome of my investigation is translated into a series of artworks that embody both the *interface* and the posthuman state. By outlining the above concepts in relation to this study, I formulate a theoretical framework within which I conduct my investigation. Therefore, these concepts, together with my practical research component, are mutually informative and together they guide my investigation into my own human-technology *interface*.

Practical Research

As I reflect upon the theoretical framework and its formulation within my investigation into the human-technology interface, I visualise the integration of my investigation's theoretical and practical components. Considering that my research is practice-based, this integration is critical to the success of my practical exploration. In this section I will address the four key concepts that structure my investigation, together with a discussion of my overall body of work as I aim to illustrate the integration of theory into the practical elements produced throughout my investigation.

Furthermore, the title of the thesis *Crafting the Digital* makes reference to the process of making as explained by Henry Slaten in his book *Techne Theory: A new language for art.* Slaten explains that 'craft' stems from the Greek word 'techne' which encompasses the skill and know-how of making. He goes on to say that techne embodies a human's practical intelligence, and therefore techne (craft) can be regarded as a foundation for the understanding of craft specifically in relation to practice by defining a human's ability or skill. Thus, the term craft or crafting, in relation to making, defines the artist's/craftsman's ability to create or generate an object by applying skills through the use of a tool (Slaten 2019: n.p.). Considering that majority of my tools are located in the digital sphere, the thesis title encapsulates the process of making (crafting) as informed by digital tools, while simultaneously referring to the process of utilising a digital space to create. Therefore, *Crafting the digital* defines the creative process within my contemporary jewellery practice, while alluding to the following view expressed by Ihde and Malafouris:

> We become constituted through making and using technologies that shape our minds and extend our bodies. We make things which in turn make us. (Ihde & Malafouris 2018: 195).

I consider this statement to exemplify the crux of my investigation into the human-technology *interface* in that the reality described in the above statement becomes evident in my own contemporary jewellery practice. I am confronted by the ways in which my relationship with technology affects my mind and body through the mediation of tools. Furthermore, I align myself with Ihde and Malafouris' statement that technology possesses the ability to constitute the human being who engages with technology to make, and this in turn transforms the human mind and extends the human body.

Throughout my research I apply my theoretical framework to my contemporary jewellery practice in order to unpack my own bodily boundaries at my human-technology *interface.* Each of the theoretical approaches inform my investigation as well as each other. Together these concepts form a linear investigation into the relationship between the human and technology, human understanding of their environment, the role of contemporary jewellery as a prosthetic device, and the construction of a posthuman state. Considering that these concepts inform my understanding of my own human-technology *interface* in a contemporary jewellery practice, each concept has

been translated into the practical component in my research. In my theoretical discussion I outline the impacts of the industrial revolutions and the historical engagement with tools in the process of technogenesis. This provides an understanding for my current way of engaging with tools and enables me to generate new ways of interacting with and manufacturing such tools, as shown in Figure 6 to 9. I engage with the process of technogenesis in order to confront the co-dependency between myself and the various digital tools I draw on in my practice. Additionally, I explore the notion of the re-tooled object within my own body of work, as I transform my tools by adapting their functionality and form. In my practical component I translate technogenesis into a creative process that entails defunctionalizing and re-inventing my own tools. Thus, technogenesis marks the point of departure for my investigation into my relationship with various tools within my contemporary jewellery practice.

In combining technogenesis with a postphenomenological perspective, I am able to analyse the role of technology in shaping my creative environment and this allows me to critically examine the digital platforms that I engage with in my creative processes. Postphenomenology also becomes an investigative lens through which I view the *interface*, as I document my design exploration whilst interacting with various tools. It was within these processes that I unpacked various forms of innovative design exploration (Figure 21 – 25). Thus, my contemporary jewellery pieces encapsulate the transformative exchange between myself and the technology that I engage with. Additionally, postphenomenology enables me to visually capture and articulate my explorations of the intangible interface through the jewellery pieces I create.

I embed the findings of my investigation within my contemporary jewellery pieces, making reference to the prosthetic nature of jewellery and the various tools within my practice. Contemporary jewellery thus becomes a tool (informed by technogenesis) by means of which I can illustrate my exploration of my own human-technology interface. Additionally, I argue that my jewellery pieces may be considered technological devices in the sense that they act as communicative tools within my investigation. In my research I introduce contemporary jewellery as prosthetic devices that can extend and transform the body either by being worn, viewed or used to perform a function. Furthermore, my investigation into my own human-technology interface has allowed me to unpack and visualise the intangible effects that technology renders upon my own body. By scrutinising the way that I engage with tools alongside my cognitive operations within the processes of making contemporary jewellery, I unpack and outline the boundaries of the digital and nondigital *interface* in relation to the boundaries of my own body. In this regard I view myself in an altered, posthuman state whist operating within and engaging with each *interface*.

The practical component of my investigation incorporates a series of contemporary jewellery pieces, sculptures, objects, virtual jewellery pieces, installations, and films. These pieces are produced alongside my theoretical exploration into my own human-technology *interface and* substantiate the discoveries in my investigation. Therefore, the practical component of my research is considered a catalyst for my theoretical investigation. My practical investigation leads me to question the boundaries of my own body during the act of making, and as a

result I apply a posthumanist perspective in order to understand the ways in which these boundaries become indistinguishable. Considering the role of contemporary jewellery as a prosthetic device that both transforms and extends the body, posthumanism encapsulates traits specific to technogenesis, postphenomenology and the prosthetic. Therefore I contend that the construction of the posthuman state is inevitable. In confronting the co-dependency of the human and technology that characterises my relationship with various technological artefacts, I redefine computer-aided design (CAD) as a form of digital prosthesis, and even the wearing of my own jewellery pieces leads me to transform my body into the posthuman state. Although I do not literally have technology embedded within my biological frame (as the cyborg does), I regard technology as subtly integrated into my cognitive processes. Therefore, I regard my understanding of self as transforming by "making and using technologies" (Ihde and Malafouris 2018: 195), which in turn extends my organic body and moulds my way of thinking. For this reason, I agree with Ihde and Malafouris about our mutually constitutive relationship with technologies, which I bear witness to within my own creative practice, as throughout my research I make 'things' which have the ability to change my body, my mind and my environment.

Chapter Outline & Literature Review

In this section I outline the structure of this thesis by providing a brief overview of each chapter. Each chapter deals with a key concept of my theoretical framework and represents a process in my practical investigation. Chapter 1 unpacks the process of technogenesis as introduced by Katherine Hayles and specifically investigates the co-evolution of humans alongside technology. By establishing technogenesis as a foundation for my investigation, I explore the technological artefact and its role in the construction of the industrial artisan. Drawing on the writings of Sheila Jasanoff (2016: n.p) and Sophie de Beaune (2004: 139 - 144), I unpack the role of technology throughout human development, while investigating the way that I engage with tools in a contemporary jewellery praxis. Thus, the role of technology in human development becomes a key factor in this chapter as I explore the way in which the boundary between the human and technology grows ever more indistinguishable, specifically within the process of making. Additionally, I provide an historical overview of technogenesis and its role in the current technological landscape. As I discuss technogenesis alongside my own contemporary jewellery practice, I allude to the subtle ways in which my own tools have evolved. By interrogating my interaction with my tools, I introduce the notion of the industrialised artisan, commenting on the way in which artists (like myself) engage with technology in the digital age. As my focus is on my own experience, I outline the evolution of technology as it relates to my relationship with various technologies in my contemporary jewellery practice. I frame technology as a prosthetic device by providing my own definition of technology as I establish my tools as extensions of my own body during the process of making. This sets the foundation for the investigation of the role of technology in the construction of the posthuman. This chapter serves to establish technogenesis as the process that directly informs my artistic practice and my mediation with my tools in a postphenomenological context. I close the chapter by discussing the notion of the re-tooled objects in relation to the works of artists Kathryn Hinton and Ian McIntyre, addressing the way in which their pieces manifest the notion of a conceptual technogenesis. I then discuss the role of re-tooling in my own engagement with technogenesis and how I translate this process in my work through the merging of various digital and nondigital craft practices.

Chapter 2 outlines the role of postphenomenology as an investigative lens in my study of the human-technology interface, while unpacking the role of technological mediation in my own experience during the process of making. I begin the chapter by introducing the philosophy of phenomenology as explained by Martin Heidegger. This forms a foundational framework for understanding of the study of human consciousness in relation to technology. Drawing on the writings of Don Ihde and Peter-Paul Vebreek, I then introduce postphenomenology – also known as the philosophy of technology – as an investigative framework within which I analyse my relationship with technology. Applying a postphenomenological perspective enables me to unpack the ways in which I transform my creative environment by engaging certain technologies in my contemporary jewellery praxis, while at the same time the jewellery pieces that I make alter my experience and understanding of my own creative process, which inevitably transforms my contemporary jewellery praxis. Therefore, I position postphenomenology as the

framework within which I explore my own technological influences in my contemporary jewellery practice. Additionally, I introduce the interface as a transformative space within which I conduct my investigation into my own technological experience. Along with the interface I discuss the works of artists Darja Popolitova and Corrina Goutos, as their work unpacks the intimate relationship that humans share with technological artefacts. Furthermore, I discuss my own work, as I interpret the influence of the interface in my practice, expanding on my own relationship with my tools. Thus, Chapter 2 establishes postphenomenology as an investigative framework in my research that aids in the understanding of the complexities of the interface, and of the role of the prosthetic in a posthuman construct.

Chapter 3 explains the role of the creation of contemporary jewellery as an enacted research process in my investigation. Additionally, it positions contemporary jewellery as a tool (within the context of technogenesis) that can be utilised as an extension of the body, thus referencing the prosthetic. I begin the chapter with an overview of contemporary jewellery and its ability to construct identities. I reference the writings of Liesbeth den Besten and Wilhelm Lindemann, as I discuss contemporary jewellery as an object embodying various forms of symbolism, and how it can be utilised as a tool both literally and figuratively. Furthermore, I explore the notion of contemporary jewellery as technology, as I discuss the writings of Nantia Kouliduo and Katja Prins. I position my own work as both contemporary jewellery and technological in nature as I discuss the construction of possible techno-jewellery and its role in my body of work. Throughout my investigation into my own human-technology interface, I am confronted with the possibility of these objects becoming an extension of my own body. Drawing on the writings of Marquard Smith and Joanne Morra, I provide an overview of the prosthetic device and its relationship with the human body. This positions contemporary jewellery as an extension of the human body, introducing the notion of contemporary jewellery as prosthetic in nature. As an illustration of this notion, I unpack the works of artists Christoph Zellweger and Maria Ignacia Walker alongside my own work. This explains the role of contemporary jewellery as a medium that can convey my ideas on prosthesis. Therefore, this chapter aims to establish contemporary jewellery as an object that possesses technological properties as a prosthetic device, while establishing it as a medium that communicates a discourse on the posthuman state.

Chapter 4 unpacks the ways in which technology affects the human body and our understanding of humanism. I discuss the posthuman as a state of being directly influenced by the technological artefact and the ways in which these artefacts become prosthetic devices that enable the posthuman construct (Nayar 2014: 21 -2). I begin the chapter with an overview of the humanism, drawing on the writings of Francesca Ferrando, Jay David Bolter, Pramod Nayar and Katherine Hayles; I aim to establish the role of the human body in the construction of both humanism and posthumanism. In introducing humanism as the foundation for posthumanism I reflect on technology's role in constructing the posthuman. Drawing on the writings of Donna Harraway, I discuss the cyborg as an embodiment of transhumanist culture and its relation to the posthuman. Additionally, I discuss the works of cyborg artists Neil Harbisson and Moon Rabis as an illustration of the cyborg body. I then introduce the work of

body architect Lucy McRae to illustrate the ways in which I differentiate between the cyborg and posthuman in order to unpack the posthuman state. In discussing McRae's work alongside my own body of work, I outline traits central to the posthuman state. In closing, I unpack my creative process in my research thus far and the ways in which it has led to my crafting the digital, by creating various contemporary jewellery devices which act as prosthetic devices transforming and extending my organic body. Therefore, this chapter serves to unpack posthumanism as a state of being in relation to technology as it shifts the human into a state of posthumanism.

Chapter 1: Technogenesis

1.1 Introduction

In this chapter I unpack the concept of technogenesis as the foundation for the development of the prosthetic and the way that this relationship between technogenesis and the prosthetic, influences my artistic practice. By investigating technological evolution alongside the development of human civilisation, in particular the way technology continues to influence human development, I explore the way in which the boundary between the human and technology grows ever more indistinguishable, specifically in the process of making. I begin the chapter with an overview of technogenesis, drawing on the writings of Katherine Hayles, Sheila Jasanoff and Sophie de Beaune. I discuss this process in relation to my own artistic processes and the subtle ways in which my own tools evolve (and as such, how I evolve alongside my tools). I introduce the concept of the industrialised artisan and the way in which artists like myself interact with technology in a digital age, and provide a definition of technology specific to my research. This discussion will extend into a brief elaboration of the notion of technological extension. My focus is based on my own idiosyncratic experiences as artist and as such I outline the evolution of technology as it relates to my relationship with various technologies in a contemporary jewellery practice.

In addition to exploring the complex relationship between myself and technology, I position the tools I develop and engage with as extensions of my own body as I begin to grapple with the notion of the prosthetic, thereby setting the foundation for the investigation of the role of contemporary jewellery as prosthetic in nature. Furthermore, I unpack the development of technology alongside human civilisation and its relation to the posthuman state. In this chapter I thus aim to establish technogenesis as the process that directly informs my artistic practice while aiding in the construction of what I perceive to be the industrialised artisan. I refer to the industrialised artisan as the craftsman or artisan whose practice is mediated by technology, and I frame myself and my own practice as falling within this definition. Therefore, my view of the industrial artisan is informed by a posthumanist disposition, where the human subject exists in a state beyond the human in the sense that technology mediates a new experience and understanding of technology as well as my creative environment during the process of making. My own work becomes the embodiment of such ideas as I combine digital and nondigital tools to make contemporary jewellery pieces. Not only do I adapt my tools, but I also adapt my processes according to my tools as they mediate the process of manufacturing various components of my jewellery pieces. In addition to my own work, I also discuss the work of artists Kathryn Hinton and Ian McIntyre while unpacking the re-tooled object, addressing the way in which their pieces manifest the notion of a conceptual technogenesis. In closing I discuss the role of technology in my own engagement with technogenesis and its relevance to my practical work through the fusion of traditional and digital crafts, and their application in my own jewellery manufacturing processes.

1.2 Technogenesis an overview

Humans have been developing and engaging with various tools for centuries. Tools are a vital part of human existence, whether for survival, to enhance their natural bodies or transform their surrounding environments (de Beaune 2004: 139). Although prehistorically technology may have been vastly simpler than technologies in today's interconnected technological world, it seems evident that the simplified tools of the past played a vital role in the development of what we know technology to be today.

According to Sophie de Beaune, a French prehistorian specialising in the evolution of tools, there is a clear progression from the technology produced during the prehistoric period to our current technology. Prehistoric tools, as de Beaune suggests, has evolved through the types of tools constructed in order to survive within a human's current environment (de Beaune 2004: 144). These tools would then later become increasingly complex as humans responded by making their tools more specialised through technical innovations in order to adapt to the different materials and environments they encountered. Once these tools were perfected, they gave rise to new forms emerging in tool construction and would continue to progress and adapt throughout the world in various civilisations (de Beaune 2004: 143).

This process is not far from my own creative practice, as I too adapt my tools to suit a given material or environment. I embrace the process of adaptation in my own jewellery production as I conduct explorations in materials and tools. In addition to my tools themselves transforming, the way in which I approach the process of making largely depends on the nature of the medium and the tool best suited for the task. If I do not possess a tool that suits the task, I adapt an existing tool, or create a new tool that meets my needs. Therefore, the driving force behind my practical exploration makes manifest the process of technogenesis in the sense that I transform my current tools collection to suit my creative needs. In addition, it is important to note that throughout my own research I consider the terms tool and technology to be aligned. I regard the term technology as a hypernym for various forms of tools, be they digital or nondigital. I draw on Sheila Jasanoff's definition in which she states that technology "covers an astonishing diversity of tools, and instruments, products, processes, materials, and systems" (Jasanoff 2016: n.p.). Therefore I recognise the tools that I use as forms of technology. This becomes a key point as I begin discussing the tools that I engage with throughout my artistic practice. I recognise a tool as an object or system that can take on various digital or nondigital qualities. By applying certain techniques to a tool, be it through the motion of my hand when hammering a piece of metal, or navigating my mouse on a digital platform, I rely on both forms of technological engagement to accomplish a certain task. Therefore, the tool is regarded as a crucial part of my artistic practice as it embodies a set of rules that applies alongside conceptual conventions and aids in creative problem solving (MacLachlan et al. 2012: 320 - 324).

As I examine the tools with which I engage, I see fragments of historical technological footprints. My hammer, saw (Figure 30), crucible, files and pliers, to name a few, are all products of technological evolution. Technology has infiltrated our homes, our cities, our workspaces and to a pervasive extent our economy. We have stepped into an age where our lives are intricately intertwined with technological devices (Verbeek 2005: 1). In terms of my own artistic practice, my creative environment continues to transform as new technological developments revolutionise the process of jewellery making. Tools such as computer-aided design, generative design, three-dimensional scanning and printing have completely changed the manufacturing process of modern jewellery (Wannarumon 2004: 569 – 575). As an artist who relies on these processes, I recognise these programs as being the outcome of technological evolution and creative problem solving. Additionally, the process of technological evolution directly influences most of the tools I currently use and this in turn influences the way in which I engage with both tools and materials. To repeat a key point:

> We become constituted through making and using technologies that shape our minds and extend our bodies. We make things which in turn make us. (Ihde and Malafouris 2018: 195).

I regard this statement as the crux of my investigation. In order to unpack this relationship between human and technology as a union that, as Ihde and Malafouris state, shapes our minds and extends our bodies I look to my own relationship with technology in my artistic jewellery practice. In retrospect, it seems as though technology has managed to cross the boundary of the *interface* where technology and the human meet, merging with my own body, as I continue to become increasingly dependent on certain digital technologies to create. Confronting this relationship is a complex task and requires closer inspection of the intangible experiences I have when interacting with my tools.

In her book *How we think: Digital Media and Contemporary Technogenesis* (2012), Katherine Hayles describes her reaction to her computer's battery running out or even the loss of an internet connection as being equivalent to feeling lost and disorientated – as if her hands have been amputated (Hayles 2012: 1). This description is not too far from my own experience when it comes to my computer or cell phone not performing as they should, as I rely heavily on computer-aided design (CAD) software to develop many of my jewellery pieces. Hayles, however, captures a pertinent point as she too positions technology as an inevitable extension of the human body.

> The more one works with digital technologies, the more one comes to appreciate the capacity of networked and programmable machines to carry out sophisticated cognitive tasks, and the more the keyboard comes to seem an extension of one's thoughts rather than an external device on which one types. (Hayles 2012: 3)

In the preface to this thesis I described my experience with the technology I engage with during my creative process. It is here that I begin to identify the co-dependency that has emerged in terms of my digital tools and, more importantly, I recognise the influence of technological evolution in my craft. This compels me to acknowledge

the process of technogenesis as having informed my current toolkit and the processes involved in production in my making of jewellery. During the first few months of this investigation I decided to confront my dependency with digital technology by returning to working with my hands, using traditional tools relating to my craft. However, I found it difficult to break from my natural tool choice, which at that stage was CAD. By returning to traditional craft-based practices, such as metalsmithing, crochet, and pottery, I sought to understand the relationship that I had developed with my digital tools; however, what I have realised is that I struggle to break away from the digital world. Instead, I have decided to embrace both worlds which has resulted in a blend of both traditional and digital craft practices.

Katherine Hayles identifies this process of co-evolution as contemporary technogenesis: "the idea that humans and technics have co-evolved together" (Hayles 2012: 10). Hayles discusses a 'contemporary technogenesis', identifying it as a process not centred on progress, but instead on adaptation. As a complex adaptive system, technogenesis can therefore be regarded as a process of engagement during which both sides (the human and technology) undergo transformative processes (Hayles 2012: 81). We see evidence of this throughout the industrial revolutions, and technology has continued to shape our environment fundamentally during the past few centuries. Hayles goes on to highlight the impacts of technological transformation on humans. Although contemporary technogenesis revolves around adaptation, its focus is in creating a harmonic balance between human and environment as it includes the transformations that both humans and technologies are undergoing (Hayles 2012: 81). This brings to light an important effect of technogenesis – the transformative process. In my own practice is seems elementary to assume the adaptive and transformative qualities of my tools; however, those same qualities are also affecting me as the artist through what I would call a transformative exchange.

As I noted earlier, my creative process has already undergone various transformations, and continues to do so. When approaching a design, I visualise the form in a virtual space known as the grid.[36] Figure 1 shows a screenshot capturing the grid which signifies my virtual studio space where I can manipulate various forms until they are refined for digital exporting, after which they can be 3D printed.

[36] The grid is a virtual space in which I construct various 3D models which can then later be 3D printed. It resembles a series of 1mm blocks that form the environment within Rhinoceros (computer-aided design software). In addition to it serving as a dimensional reference, the horizontal (red line) and vertical (green line) mark the x and y axis, and where they meet is regarded as the centre point of the grid. These lines serve as markers that allow the artist/designer to accurately construct pieces according to size.

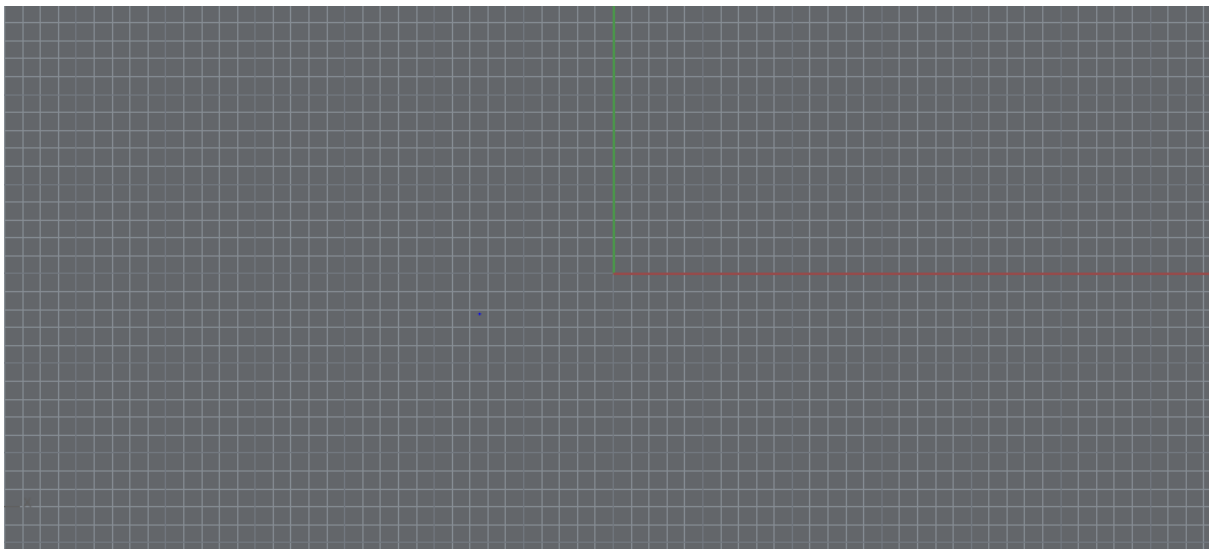

Figure 1: Luché Oberholzer, 2019. The Grid. Digital Image of Rhinoceros 6.0 interface.

This virtual space has transformed the way in which I approach designing and making jewellery pieces. By conducting my creative process within this space, I have become accustomed to certain tools, that cannot be found in the physical world. Consequently, the way in which I approach design has been transformed through the use of CAD software. Not only has this reconstructed the way in which I approach design, but it also changes the way I make contemporary jewellery. I regard this relationship and transformative exchange as an embodiment of the process of technogenesis in my own artistic practice.

1.21 The Industrial Artisan

The discussion of technogenesis in correlation to my own creative practice relates to the term 'industrial artisan' as coined by Glenn Adamson in his book *Craft Reader* (2010). Adamson describes the effects of the industrial revolution on the craftsmen of the 18th century and is of the opinion that, although typically the revolution was to be associated with replacing the craft scene, perhaps it could be seen has having occurred in favour of the modern craftsman, whom Adamson identifies as the 'industrial artisan' (Adamson 2010: 43 -47). I encounter the notion of the industrial artisan in the technogenetic transformations I experience as the artist and in the tools that I engage with. To draw reference to this, I discuss tools in my own studio, which I argue is a product of technogenesis. Through the introduction of additive manufacturing,[37] specifically in the manufacturing of jewellery, the jeweller's ability to make pieces transcends his/her workbench (Figure 2). The jeweller's collection of hand tools has slowly transformed over the decades to become various different versions of themselves. For example, jewellers traditionally engage with an analogue form of additive manufacturing on the bench through the construction of

[37] Additive manufacturing refers to the process through which a model which is produced "using a three-dimensional Computer Aided Design (3D CAD) system, can be fabricated" (Gibson, Rosen and Stucker 2019: 1-2) This entails the production of 3D objects which are translated from computer-aided design data onto various additive manufacturing machines such as a 3D printer.

various metal pieces. However, as a consequence of technogenesis in this industry, digital tools such as CAD adapt these same processes, as these same pieces can be constructed in a digital interface. Additionally, digital fabrication technologies such as the 3D printer[38] (Figure 3) can be regarded as manifesting the evolution of a manufacturing process that transforms the jewellery manufacturing process. In my own studio I engage with my workbench to manufacture components in my jewellery pieces (Figure 4). However, I primarily translate most of my designs from the virtual design space into the physical by additive manufacturing/3D printing. The 3D printer serves as a tool that transforms the virtual into a physical object, by translating the objects that are 3D modelled in a CAD interface into various resins which can then be incorporated into various jewellery pieces. As a result of the current digital landscape, I have begun to alter the way in which I approach my artistic practice. Through constant adaptation in both creative processes and engagement with tools, I have reconstructed my creative mindset and skillset. Therefore, technogenesis directly informs my contemporary jewellery practice and the pieces that I manufacture. In combination with technogenesis, it is necessary to acknowledge key historical components that have revolutionised technology as I know it today. Although the industrial revolution has not directly impacted this study, there are certain characteristics of the subsequent revolutions that have led to many of the technological advancements during the current fourth industrial revolution (Jasanoff 2016: n.p). In the following section I will provide a brief overview of the first and fourth industrial revolutions as they relate to this study in order to identify the role of the industrial artisan.

[38] The process of 3D printing is regarded as additive manufacturing and "involves a number of steps that move from the virtual CAD description to the physical resultant part" (Gibson, Rosen and Stucker 2019: 3). This process starts within a CAD software model, where a 3D model is constructed within a virtual space. Once the 3D model has been completed, it is converted into a stereolithography (STL) file format, which "describes the external closed surfaces of the original CAD model and forms the basis for calculation of the slices" (Gibson, Rosen and Stucker 2019:4). The STL file is then transferred to an additive manufacturing machine such as a 3D printer. The 3D printer is set up according to the models parameters which include the material constraints, layer thickness etc. Once this process has been refined, the building of the part is initiated through an automated process (Gibson, Rosen and Stucker 2019: 1-6).

Figure 2: Luché Oberholzer, 2020. Jeweller's Bench. Digital image of jewellery work bench.

Figure 3: Creality, 2020. Ender 3-V2. Digital image of three-dimensional printer.

Figure 4: Luché Oberholzer, 2020. Chase and repoussé. Digital image of chase and repoussé process captured on the jewellery bench.

While technology has co-existed with humans for centuries, it is the first industrial revolution that accelerated the production and invention of new technology with a concomitant "decline of traditional skills and a replacement of the living, breathing, thinking craftsman by the inhuman machine" (Adamson 2010: 43). An example is the mechanisation of the weaving loom (Figure 5) by Joseph-Marie Jacquard during the early 1800s. Jacquard's invention was the first to store binary information through a "punch card system" (Roux 2018:103) and radically transformed the process of hand-weaving. This is one example of the many inventions in the 18th-century industrial revolution that would alter the process of manufacturing for decades to come, and which would at the same time impact on the development of the artisan and his/her crafting process. During this time the status of automated technology gained major renown and became an intrinsic part of human life (Campbell 2004: 43). Manufacturing continued to undergo revolutionary changes but remains the "backbone of a modern industrialised society" (Oberholzer 2018: 12). As transformative technologies' presence in society increases, we become witness to the inevitable transformation of human life and our environment.

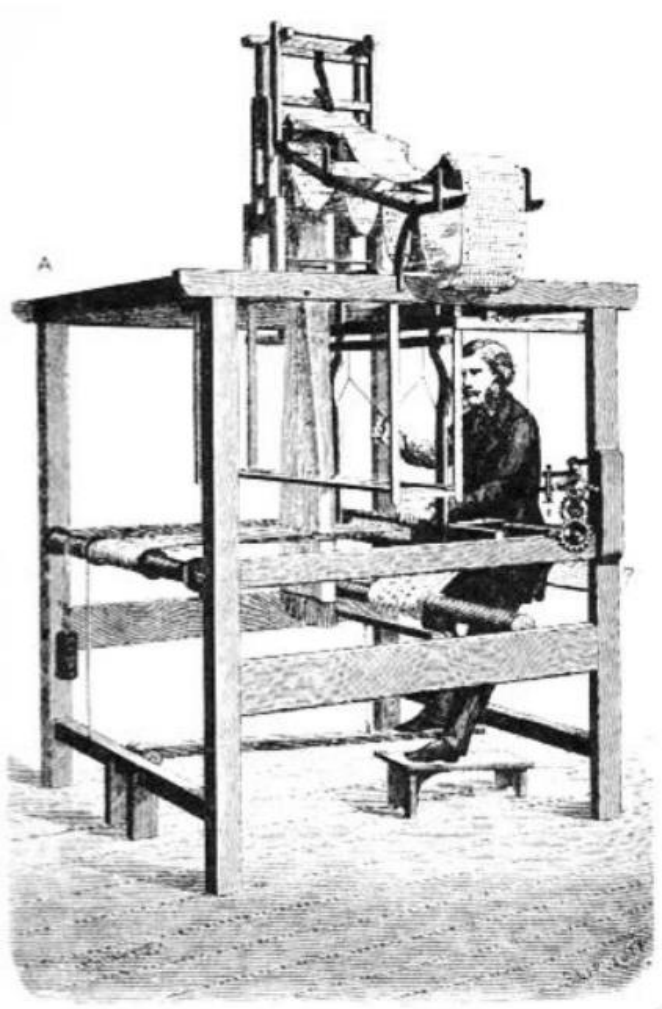

Figure 5: Ptak, n.d. Jacquard Loom. Illustration of Joseph-Marie Jacquard's mechanised weaving loom. (Source: Roux 2018: 102).

With regards to the technological development of craft processes, I contend that the first industrial revolution formed a basis for creative tool expansion and set the foundation for the development of 'the industrial artisan'. Although these developments occurred mainly in factories and what is considered industrialised forms of production, they were key in establishing the technological infrastructure in modern society (Campbell 2004: 18-20). Jacquard's loom is an example of a machine whose operating system marks one of the earliest forms of binary code,[39] which may have been a crucial development in terms of the digital interfaces we know today (Roux 2018: 103). By expanding the loom into an automated device, the weaver was prompted to adapt the weaving process alongside his/her equipment. Where previously the weaver thought of his/hands as the driver for the weaving loom,

[39] Binary code refers to a computer language consisting of the numbers 1 and 0. These numbers form a pattern that communicates information within the processor of computers (Roux 2018: 103).

Jacquard's invention altered the process of weaving altogether. I regard this shift as an illustration of the development of the industrial artisan.

In the light of Adamson's view of the impact of the industrial revolution, I argue that it transformed the artisan's environment instead of replacing it. In his book *Inventions of Craft* (2013), Adamson highlights an innovative partnership that emerged during the first industrial revolution. This suggests that the collaboration of craft and industry may have pioneered subsequent developments in our current craft environment (Adamson 2013: n.p.). In terms of the industrial artisan, "Skilled making by hand is crucially important to craft-based contemporary artists, yet their methods and tools rarely remain static" (Zilber 2015: 10-11). This suggests that creative practices are ever-evolving, resulting in the vast development of digital processes and tools available to artisans today. To illustrate this evolution in a creative practice, I refer to the transformation of the ceramicist's tools. Traditionally ceramicists have manufactured clay/ceramic pieces using a form of additive manufacturing, in which they build ceramic pieces using a combination of clay parts which they make and assemble by hand (Gibson, Rosen, and Stucker 2019:165). This process can be regarded as analogue, using nondigital tools to create clay forms. Although ceramicists make use of various nondigital tools to shape these pieces, the tool they rely on most is their hands. Later the potter's wheel[40] "became widely used for spinning the clay into the desired shape, but the older technique of building pots by hand from rolls of clay remained in use for some purposes" (Buchanan 2019: Online). In the current digital landscape the potter's wheel has somewhat transformed into the virtual space, as ceramicist's now have the ability to 3D model and print their ceramics using a ceramic 3D printer.[41] In this regard the ceramicist's tools have undergone an evolutionary process in which they have shifted from a mainly analogue process to a digital one. It is this process of technogenesis prevalent in ceramic-based practice that becomes an illustration of the ways in which artists "destabilize, engage, and activate the object in unconventional ways" (Zilber 2015: 11). Therefore, craft is no longer bound to a certain set of rules, but instead evolves alongside the artists and their environment (Zilber 2015:11).

The current fourth industrial revolution[42] could be viewed as the most influential for this study in terms of the digital landscape it has constructed and the technologies it has currently made available in contemporary jewellery practices. Similar to that of the ceramicist, my own craft environment has been radically transformed. With

[40] The potter's wheel refers to a nondigital tool which consists of a pedal and a spinning plate on which the clay is positioned. While the clay is spinning, the ceramicist manipulates the clay into various forms using their hands and/or various nondigital pottery shaping tools. The following film illustrates the process of throwing a clay pot on the potter's wheel: https://www.youtube.com/watch?v=NnEUTYwTwI8 (Ingleton Pottery 2017: Online).

[41] A ceramic 3D printer is a form of rapid prototyping in which an additive manufacturing process is applied to 3D print ceramic pieces. Ceramicists would first need to 3D model their pieces within a digital space and later export the file for printing. The following film illustrates the process of a ceramic piece being 3D printed: https://www.youtube.com/watch?v=uuVGNSNaOjk (WASP team 2019: Online).

[42] In his book *The Fourth Industrial Revolution* (2016), Klaus Schwab explains that the fourth industrial revolution is quickly unfolding and that it will inevitably transform human life. Digitalisation has become the postmodern technological phenomenon which enables one to build a virtual world from which one can control the physical world. Characteristics include but are not limited to artificial intelligence, virtual as well as physical systems, machine learning and the mobile internet (Schwab 2016: 6–12). Schwab states that the human agent is the driving force behind the technological revolution and that the human agent can use it to improve the state of the world. He goes on to say that the fourth industrial revolution is "not only about smart and connected machines and systems. Its scope is much wider"; he suggests that the fusion of technology and its interaction with the physical, digital and biological platforms makes this revolution "fundamentally different" from its predecessors (Schwab 2016: 9–12).

exponential expansion characterised by emerging technology the boundaries between physical and digital spaces are becoming increasingly blurred (Schwab 2016: 7 -12). The artisan now witnesses an emergence of industries promoting a dualism of traditional and digital practices (Adamson 2010: 585 – 588). This dualism is a catalyst for my own creative process as I create within both physical and digital spaces and as a result my jewellery pieces are a product of combining traditional and digital tools and the materials associated with them. Prior to the 18th-century industrial revolution, the process of making in a craft-based practice would have been limited to what the human hand was capable of, or an analogue tool/machine. However, at present the craftsman (me) has the ability to construct and model in a virtual space, and then later 3D printing the model in a physical space. Thus, the process of making, the artisan's interaction with technology and the artisan herself have undergone a complete transformation since the 18th century. Contemporary art educator and writer Emily Zilber[43] explains this best:

> In recent decades, there has been an unprecedented shift in the types and number of tools available to artists, and not just to those deeply engaged with craft. The accessibility and use of tools such as computer-aided design (CAD) and fabrication have had a profound impact on both the planning and the execution of craft-based work, becoming in many ways as integral to the practice of many artists as are the chisel, the lathe, and the soldering iron. Viewed within the larger trajectory of craft's history, tools such as a digital laser cutters, milling machine, and 3d printers are logical, even comfortable extensions of their analog predecessors. Modes of making and their subsequent re-toolings can be situated together on an extended, nonhierarchial continuum. (Zilber 2015: 10)

It is evident (based on the above discussion) that technogenesis entails a complex continuation of development in both technology and human cultural life, and that this progression is continuously undergoing revolutionary changes. As Zilber suggests, this process entails an extension of our analogue tools along a form of continuum. She goes on to say that artists in the latest industrial revolution carry on doing what they have always done, which is to "push the boundaries of how an object might be made, with or without the aid of newly developed or available technologies" (Zilber 2015:10). This process remains embedded within many artistic practices, but more specifically, it is embedded in my own creative practice, as I work with emerging technologies alongside traditional techniques. By extending and enhancing existing tools, the industrial artisans of the 21st century can continue to bring together conceptual ideas, pairing them with their knowledge of a physical skillset in terms of making with tools and materials. It is no longer unusual for the craftsman to adapt and make his own tools as we see artists apply various already available tools to their practices. These tools can range from traditional hand tools to various kinds of computer software and complex manufacturing systems (MacLachlan, Earl and Eckert 2012: 317 – 326) and, as mentioned, there is now an increase of merging these tools at present (Nagai et al 2009: 648 -675).

[43] Emily Zilber is an educator, curator, writer, arts administrator and consultant who "developed the curatorial program for craft and design after 1955 within the museum's contemporary art department" (Zilber n.d.: Online). In her book *Crafted: Objects in Flux* (2015) she outlines the paradoxes of contemporary art in the craft media, discussing the ways in which contemporary art "bridges ancient traditions and state-of-the-art technologies, cutting-edge concepts and enduring tenets about skilled making" (Museum of Fine Arts, Boston 2021: Online).

In practice I move between the digital and the physical; I recognise this dualism as a relationship that transcends my tools. Through my collaboration with my tools, I regard my body as having undergone a transformative process, which reconstructs the way in which I approach making pieces. Before I embraced this process, I intentionally separated my digital and physical spaces, but I contend that this rendered limited results. However, by combining pottery, crochet and metalsmithing with 3D scanning, 3D modelling (CAD) and 3D printing, I am able to expand my own practice, tools and the pieces that emerge in making. In this regard I make use of various techniques and materials in my own creative praxis (not only related to traditional jewellery processes and materials), referencing different craft processes that have transformed with the development of technology. This reinforces the notion that the mutual dependency and co-evolution of technology and humans have infiltrated various aspects of human existence. Consequently, I identify with Glenn Adamson's notion of the industrial artisan, whilst simultaneously drawing on Emily Zilber's discussion of the modern craftsman, in which she highlights the modern craftsman's ability to push the boundaries of making (Zilber 2015:10). Whether this is done by embracing a dualism of digital and nondigital tools, or simply re-inventing the traditional ways in which we engage with tools, the key lies in the fluidity of adapting alongside technology in order to embrace the contemporary craft landscape.

1.3 Technological Bodies

In combination with the notion of the industrial artisan, the role of technology in relation to the body becomes a point of interest in my study. Technology as we know it today is far more intricate than it ever was; however, technologies can still be regarded as a tool in that it is a result of an evolutionary process that began with prehistoric tools, but over centuries it has transcended the analogue state and now become integrated with a digital space. In today's context technology may conjure images drawn from a world of computers, tablets, cell phones or any other electronic media. While these are all forms of technology, the term can also include robotics, the manufacturing industry, nanotechnology, plastic implantations, biomedicine and artificial materials, to name a few (Jasanoff, 2016: n.p.). While some of these technologies impact on my environment, they are not altogether relevant to this study as they do not directly inform my process. However, understanding the role of technology as a result of co-evolution and an object of human enhancement and bodily extension is particularly pertinent in conducting my investigation.

With regards to my own interactions with my tools as well as the tools that I reference, there remains a balance between both digital and non-digital platforms. Conventionally, there is a perception of craft being rooted in the handmade, but most of the materials used in the processes are worked by tools to some degree. David Pye suggests in *The nature and art of workmanship* (2008) that tools are usually specific to a particular material (Pye 1995: n.p.), which allows the craftsman a refined control over the process of making with a specific medium in mind (MacLachlan 2017: 39). Emily Zilber adds that handmade skilled making is crucial in contemporary craft

practices, but that these processes rarely remain fixed (Zilber 2015: 10). The combination of both traditional and modern making techniques is also not unfamiliar, as Zilber explains:

> Many artists address these concerns head-on through artworks that cultivate a productive and complicated relationship to craft's pasts by integrating new and old technologies and forms seamlessly, and drawing our attention to moments in the history of the field that might deviate from standard narratives of why the use of craft matters within art making. Simultaneously empowered and unburdened by these pasts, these artists demonstrate the vitality and viability of choosing skilled craft as a strategy for contemporary artistic practice. At the same time, they resist the notion of craft as a bounded set of paraments within a specific hierarchy of values and instead seek to destabilize, engage, and activate the object in unconventional ways. (Zilber 2015: 9)

I apply a similar approach in my own practice by developing and engaging with tools that I consider to be best suited to manipulating a specific material. I accept a certain measure of fluidity in this process so as to allow for experimentation with tools, which as MacLachlan suggests can often lead to other creative outcomes (MacLachlan 2017: 89). In relation to the fourth industrial revolution, technological advancements have also largely impacted on my use of tools as well as material engagement. By making alterations to my tools, I not only have an impact on the results of the way in which that tool interacts and affects the material, but also the way in which the tool relates to the body (MacLachlan 2017: 93 -94), illustrating the impact that access to tools and technologies has on my own artistic practice, both in the planning and production of my pieces. My tools therefore become an extension of my own body and mind, as they become a means to execute control in my creative process.

Establishing the role of technogenesis in my tools and my practice allows me to further unpack the function of the tool itself, and more specifically, understand how it translates into my contemporary jewellery practice. To reiterate what I mentioned earlier, I consider the terms 'technology' and 'tool' to be integrated, and furthermore, I identify technology as an overarching term used to refer to various tools both analogue, digital, traditional, and modern. As this study is conducted in terms of my own artistic practice, my perception of tools is located very much within a craft environment. This means that the nondigital tools I engage with are related to craft-based practices and are specific to the processes adopted in metalsmithing, crochet and pottery.

Figure 6: Austin Radcliffe, 2010. Collection of clay tools. Digital Image. (Source: Radcliffe, 2010: Online)

The imagery of the nondigital tools as depicted in Figure 6 and the digital tools as shown in Figure 1 andFigure 31 becomes a source of visual inspiration in terms of design process and material engagement. I do not only reference the tools in my toolkit, but also draw on images of other traditional tools associated with these practices. The forms in these images are then translated into various design explorations which later manifest into the pieces I create. Visually the tool as an object and platform of engagement becomes the source of visual stimulation in my design process and by engaging with the visual aspects of each tool in relation to their function I investigate my own interaction between hand and tool.

In addition to the role of technology in my own practice, I position myself – the industrial artisan – as an agent in the process of contemporary technogenesis. In combination with this, I draw on Emily Zilber's profound statement

in which she 'centralises' craft in both the hand and the tool. "As much as craft is centered in the hand, it is also centered in the tool" (Zilber 2015: 17). This affiliation of hand and tool not only resonates with the process of technogenesis, but it also relates to the notion of technological extension, presenting the human hand and tool as being interconnected. Just as the hand can apply paint with the stroke of a finger, so also the combination of hand and paintbrush can become an alternative mode of application. The hand alone can be regarded as a natural tool, but by adopting another tool (the paintbrush), the hand undergoes a form of extension, or enhancement.

In this regard, my exploration of my own tools in relation to my body is a means for me to explore and recognise the extent to which my tools have the ability to extend beyond the physical and into the virtual. In the light of this, the idea of the tool can then precede the physical manifestation of the tool (Ihde and Malafouris 2018:195-197). I can create tools within a virtual space that can function both within that same virtual space, but also in reality. Hence, the digital platform on which I create can be regarded as a digital extension of my own body, or as I would like to identify it, a form of digital prosthesis. In addition, the tools I engage can therefore be seen as constructed through my own creative intentions, continuously remaining in a state of flux.

1.3.1 The Re-tooled Object

As new craft possibilities arise in terms of custom-made machines, software and even altering the chemical composition of certain materials, the scope of the technologies available to the industrial artisan is vast (Zilber: 2015: 11). Additionally, modern alterations and modifications applied to existing tools in contemporary artistic practices are becoming more and more prevalent through the transformation of the functionality of certain tools and restructuring them to solve design problems (Zilber 2015: 9 -15). By positioning my contemporary jewellery tools within a continuous state of flux, I draw on the notion of re-tooling as formulated by Emily Zilber. Zilber explains re-tooling as a process in which tools/technologies transform and thus enter a "state of perpetual flux between past traditions and future innovations" (Zilber 2015: 11). To reinforce the notion of re-tooling in crafts (the process of making), I refer to my discussion of the potter's wheel in section 1.2.1. of this dissertation (page 30), where I argue that the way in which the ceramicist's tools have transformed over the decades best represents the notion of re-tooling[44] in the sense that the modern ceramicist has access to various digital and nondigital tools to manufacture ceramic pieces. These tools range from traditional techniques that utilise the ceramicists hands and various shaping tools as well as the potter's wheel to throw ceramic pots, to current innovations such as the 3D modelling and the ceramic 3D printer. Considering the available tools, ceramicists have the option of specialising in a technique or moving between these techniques in order to make ceramic pieces. Similarly, the jewellery designer's tools have also progressively evolved over time. Jewellers also have the option of utilising traditional techniques by making pieces using their nondigital tools in combination with their hands, or otherwise incorporating

[44] Although I focus on the ceramicist, this notion is not central to ceramics, but exists within many craft-based practices. Considering that I engage with a ceramic process within my own practice, I explain my understanding of re-tooling in relation to ceramics, as well as my own jewellery making tools.

various digital tools such as computer-aided design, 3D printing, and CNC milling to name a few. Considering the evolution of technology in craft-based practices, I contend that the notion of re-tooling can be seen as a product of technogenesis in that it encapsulates the action of transforming existing tools into new innovative versions of themselves and presents the industrial craftsman with the opportunity to draw on traditional techniques while engaging with modern technologies.

Based on my discussion of technogenesis it is evident that, in relation to my own practice, both nondigital and digital tools continuously evolve as a result of technological developments. I experiment with the evolution of tools in my own creative practice by applying alterations and careful modifications. Consequently I am able to re-invent my own tools and arguably defunctionalize[45] them in terms of their original intention to suit my own purposes. This can be regarded as a form of re-tooling, a process in which the tool undergoes various transformative processes with the intention to either improve or customise the tool. However, by moving between digital and nondigital technological engagement, I also engage with the notion of re-tooling. Whether it is through the manipulation of the tool's conceptual representation or the tools physical properties, the tool can be seen to evolve into a different object. This then develops the existing tool into a new type of tool, or by the deliberate act of removing the original function of the tool, I can render it defunctionalized, in that the function of my tools become destabilized during the making process (MacLachlan 2017: 92 -94).

Artists such as Kathryn Hinton and Ian McIntyre embrace the process of re-tooling in their own practices. I draw inspiration from both these artists as they explore various forms of tool engagement, and more specifically, reconstruct their tools in innovative ways. Kathryn Hinton,[46] who is also a contemporary jewellery designer, applies the process of re-tooling in her artistic practice by combining traditional and digital craft techniques to develop a range of silverware (Crafts Scotland n.d.: Online). Figure 7: *Small Faceted Bowl,* illustrates one of her pieces created through the combination of these two techniques (digital and nondigital). Hinton alters her tools by "blending the functions of physical and digital tools" (MacLachlan 2017: 97). She refers to this process as "digital silversmithing" (MacLachlan 2017: 97) in which she developed a digital hammer that transfers its movements by means of a USB to the digital software known as Z Brush. As she manoeuvres the digitalised hammer in a physical space, the computer translates these movements into a digital space. Although the hammer is not being applied to a physical piece of metal, its translated movement impacts on a virtualised metal bowl. Once the bowl is modelled in 3D, the piece is then exported, 3D printed, and cast in silver (2018: 97). Hinton converts the traditional hammer into a digital version of itself. The use of the tool remains similar, but the process and outcome are altered.

[45] Defunctionalisation is a term introduced by John Reynolds in 1972, and is specifically applied to computing programming languages. At its core it can be seen as the antithesis of the term functional (Nielsen 2001: 1-8). In this study it can be understood as a deliberate action of removing the normal associated function given to a tool or object.

[46] Kathryn Hinton is contemporary jewellery designer and silversmith who is based in Edinburgh. Her work entails the exploration of geometric forms on a computer-aided design platform. She combines traditional hand skills with digital technology to create silverware with emerging surfaces and geometric forms (Crafts Scotland n.d.: Online).

The same movement is applied to the digital hammer as would be applied to a traditional one, but instead of the hammer making contact with the metal, it is now making virtual contact with the 3D-modelled bowl. I regard this as the perfect illustration of the blurring of digital and physical space in terms of craft. The traditional process is still implemented, but the outcome is altered and presented in a digital space first before being printed to cast. Not only is there a fusion of craft, both nondigital (traditional) and digital, but Hinton purposefully repurposes the function of the traditional hammer. Therefore, her process embodies the re-tooling of a hammer as she moves between physical and virtual spaces in her creative process.

Figure 7: Kathryn Hinton, 2010. Small Faceted Bowl. Silver. Digital Image. (Source: Crafts Scotland, n.d: Online).

Another artist who applies modifications to his tools and arguably defunctionalizes them is ceramicist Ian McIntyre.[47] Although McIntyre does not blend digital and physical design spaces, he alters his tools in the process of making in order to modify the outcome. Figure 8 illustrates McIntyre's *Broken Vase,* a piece cast in fine bone china after the mould was altered in the creative process. By hammering into the plaster mould (before pouring in the slip), McIntyre breaks the rim and disturbs the moulds initial form, ultimately altering the tool with which the vase is cast; this process can also be regarded as a form of re-tooling (McIntyre n.d.: Online). By chipping away at the plaster mould, McIntyre is purposefully removing the initial function and instead replacing it with a new fractured version of itself, which in turn yields a completely new object. Thus Figure 8 could be regarded as

[47] Ian McIntyre is an artist whose work combines craft skills with industrial design. His work consists of various ceramic pieces. He explores contrasting materials specifically in relation to plaster through purposefully breaking and otherwise altering the mould (McIntyre n.d.: Online).

illustrating the outcome of a tool that is defunctionalized in the creative process. By altering the mould's form, McIntyre removes its initial function and strips the purpose of the mould, reconstructing it into a new one.

Figure 8: Ian McIntyre, 2008. Broken Vase. Fine Bone China Cast. Digital Image. (Source: McIntyre 2008: Online).

Both Hinton's and McIntyre's processes can be recognised as forms of destabilising the notion of the tool, or more specifically, as re-tooling. What becomes interesting is the various ways in which this process can be interpreted and applied in an artistic practice. In her book *Crafted: Objects in Flux* (2015), Emily Zilber discusses the notion of the re-tooled object specifically in relation to craft. Zilber explains that the increased access to digital and non-digital tools allows the contemporary manipulations of materials. These tools may even be from outside the practice of the designated craft. She uses computer-aided design as an example of a tool that would usually be connected to non-craft industries, but is currently being used as a craft-based digital tool in jewellery design, carpentry and even pottery. Processes and tools that were once exclusively owned by industries are now incorporated into artists' creative practices (Zilber 2015: 9 -15). "Artists continue to expand the physical and conceptual possibilities of the material through the tools they use and the way in which they use them" (Zilber 2015: 9). Zilber introduces the term re-tooling in her book as she discusses the ways in which this process can be a source of inspiration in the

content and concept of craft. She goes on to say that it provides artists with the means to use tools that are both old and new, and they can therefore redefine these tools to suit their practice (Zilber 2015: 9-15).

The notion of the re-tooled object is also frequently visited throughout my practical body of work. Like Hinton, I combine digital and traditional methods to create various jewellery pieces, and like McIntyre I alter some of my pieces, by modifying their function and form in the process. The digital tools I engage with can also be seen as tools associated with the industrialised jewellery industry. Without initially realising it, I embraced the process of re-tooling in my own practice in order to develop new tools that I customised to suit my creative needs. I consciously rely on traditional and digital tools in my practice, as they become mutually informative. My knowledge about traditional hand-made jewellery informs my process in Rhinoceros 6.0 (a computer-aided design software). Without that knowledge the result would be drastically different. Additionally, the way that I manufacture jewellery currently compared to the way in which I manufactured jewellery five years ago is radically different. I recognise this as a process of transformation and adaptation to my increasingly digitalised environment. Technogenesis therefore becomes a process that I engage with in which I adapt my own tools to fulfil a specific need, and in turn my process evolves with it. In this regard, the re-tooled object can be considered a result of technogenesis. I also begin to see a fusion of my manual and automated tools, which relates to Kathryn Hinton's work in the sense that her work illustrates the transformation of a traditional technique into a digital tool through the translation, for example, of the traditional hammer into a digital hammer using computer-aided design.

My jewellery pieces consist of components that are 3D printed, which are assembled by hand and combined with various metal fittings. By incorporating fragments of both the traditional and digital processes, I gain an understanding of the manual process of making in a specific medium, which in turn allows me either to adapt my custom-made tools for that specific medium, or to gain further insight into transforming the technique within a digital platform. Furthermore, in relation to my body, the tool also informs the way that I interact physically with both material and tool. This becomes evident in my series *Post-human* (Figure 9-11), which consists of three ceramic sculptures. In this series I incorporate 3D modelling[48] by constructing a 3D model in Rhinoceros, which is exported to 3D print in PLA. The 3D printed piece is used to make a mould for ceramic slip casting. By incorporating 3D modelling and 3D printing, I remove the role of the human hand's direct interaction with the material during the process of manufacturing a mould in order to construct my sculptures. Instead, the hand mediates a virtual tool that creates a form that can be 3D printed in PLA. Once this form is 3D printed, I once again incorporate the human hand in order to make a plaster mould and cast ceramic slip. The same form is cast multiple times, then allowed to dry until leather hard after which it is altered into various other forms. Each cast ceramic piece is altered through the cutting away of parts and insertion of holes in order to add crocheted forms after firing. Later these pieces are fired and completed by adding various crocheted forms. Throughout this process, I purposefully

[48] The following video illustrates my process of 3D modelling within Rhinoceros 6.0 a computer-aided design software (CAD): https://youtu.be/fYqzeaTRguU (Rossouw 2021: Online).

transform and alter the natural shape of the original form into something 'new'. Although the crocheted forms do not directly resemble the pieces that are cut away from the clay forms, they manifest new forms that can be seen to grow onto the ceramic piece, becoming a foreign[49] extension of the ceramic vessel. Thus, these sculptures undergo three transformative processes: first, through being translated from the virtual into the physical; second, by altering the clay structure; and third, by adding a foreign material that merges and extends the ceramic vessel. The crocheted forms in each piece embody the transformative nature of technology in that they become an extension of the ceramic vessel, in the same way the digitalised technology becomes an extension of my hand. The crochet replaces a section of the existing form with an alternative form that is less rigid and fixed, becoming an expression of technology's fluidity in contrast to the human body. These contrasting materials create a binary narrative that expresses my own subjective experience at the *interface*, where I experience my body as fixed[50] in comparison to my virtual interactions which remain in flux.

[49] The use of the word 'foreign' aims to express the contrast between the two materials in these pieces.

[50] By referring to the experience of my body as 'fixed' I argue that my body (specifically my hands) are limited in comparison to certain digital tools which I experience as fluid. When making ceramic pieces by hand, my interaction becomes quite fixed as the human hand has limited effects on clay. This also applies when my hand interacts with a tool to work with the clay. Even though the tool will interact with the clay in a different manner to the human hand, the effect is still fixed to the form and function of the tool. When I incorporate digital tools such as CAD software and 3D printing, I am not limited by my hand or a tool, and so in my experience this process of making (in collaboration with digital tools) becomes far more fluid.

Figure 9: Luché Oberholzer, 2020. Post-Human 1. Ceramic, crocheted steel wire. Digital Image.

Figure 10: Luché Oberholzer, 2020. Post-Human 2. Ceramic vessel, crocheted steel wire. Digital Image.

Figure 11: Luché Oberholzer, 2020. Post-Human 3. Ceramic, crocheted steel wire. Digital Image.

By combining computer-aided design and traditional jewellery making tools, I develop new tools which can be printed and cast in various materials to use in my processes. Although I develop new tools, these can also remain conceptual and are not necessarily used to make other pieces. I personify the removal of a tool's function by incorporating various tools shapes, but also purposefully removing the functional component of the existing tool. This is applied in my pieces *Techne 2* and *Techne 3* (Figure 43-44), where I incorporate a fragment of the tool, suggesting the interruption of the tool's transformation in the process of technogenesis. In the piece titled *Techne 2* (Figure 43), I reference the potter's rib (shaping tool) that has seemingly been split in half. On the edge of this form is a crocheted wire edge which is suggestive of the fact that the rib is missing its other half, as if to exaggerate the notion that a part of the potter's rib has been forgotten, or in this sense intentionally removed. Similarly, *Techne 3* (Figure 44) references the wire-cutting handles also shown in *Techne 4* (Figure 14) and illustrates a single handle that essentially has no function other than to be held, thus missing the key components that contribute to its structure as a cutting tool. In this regard, *Techne* 1*,* 2 and *3* illustrate a conceptual tool that is derived from a tool in my contemporary jewellery practice, but cannot necessarily perform a function, thus rendering it defunctionalized. While these tools can be considered as defunctionalized, I manufacture functional tools as well.

Figure 12 and Figure 13 illustrate a ring that I designed and manufactured to manipulate clay while working on a clay wheel. As the clay spins, the ring can be worn as illustrated in Figure 12. By applying pressure using the fin side of the ring, one can then create a profile in the clay identical to the fin. Once the piece has been thrown, the back side of the ring (Figure 13) can be used to pat the piece and remove any unwanted texture. Consequently, this jewellery piece is both ring and tool and can be used as such; however, the focus of this piece is to illustrate the extension properties of the clay modelling tool. When worn, this piece sits between two fingers subtly merging with the hand; as a result, the tool component is an extension of the hand while modelling clay; however, the ring component is not necessarily extending the body, but instead merging with the body. The materials used to construct this piece also draw on the prosthetic nature of the tool as the piece is a combination of 3D-printed ABS, coated with a white matte paint, and finished off with oxidised silver caps, and a fin.

Figure 12: Luché Oberholzer, 2019. Techne 5. Ring and Modelling tool. Oxidised Silver, PLA plastic.

Figure 13: Luché Oberholzer, 2019. Techne 5. Ring and Modelling Tool. Oxidised Silver, PLA plastic.

Figure 14 similarly depicts a jewellery piece with a dual purpose; however, this piece is worn quite differently to the modelling tool. The cutting tool is a piece that is designed to function as a wire cutter (for clay) and a neckpiece. As a tool this piece can be used to cut pieces of clay from a slab in preparation for working the clay. The two handles at either end of the wire are handles that can be held in the hand, allowing one to adjust the wire accordingly to cut the clay – as depicted in Figure 14. As a jewellery piece, the wire drapes around the back of the neck, with each handle then draping along the torso either parallel to each other or slightly off centre. Considering that the hand could not cut the clay as well as the wire cutter, this piece can be regarded as an extension of the human hand in extending from either handle, enabling the human body to cut the clay. Similar to the modelling tool, this piece is constructed from 3D-printed ABS and oxidised silver, with the additional tiger tail to serve as the cutting element. These two pieces reference the prosthetic nature of tools, in that these pieces become physical extensions of the hand in order to manipulate clay.

Figure 14: Luché Oberholzer, 2019. Techne 4. Wire Cutter and Pendants. Oxidised Silver, PLA, tiger tail.

While I regard the jewellery pieces that I create as illustrating the extension properties of the prosthetic, the materials and processes simultaneously reference notions of the prosthetic. In terms of my materials, I incorporate plastic ABS and PLA pieces into my work in order to reference the artificial properties of the prosthetic, as the material are considered both foreign and manmade in contrast to the metal and clay that I work with, which are both extracted from the earth. In combining the plastic with metal fittings, I aim to illustrate not only a visual fusion of craft, but more specifically I reference the notion of the prosthetic device merging with the body. The metal becomes a reference to the machine-body, or the industrialized artisan. Therefore, both the above-mentioned pieces simultaneously embody the notion of the prosthetic extension in relation to the body, while illustrating the increasingly indistinguishable boundary between the human and technology.

In addition to these pieces that can be regarded as the result of objects undergoing a re-tooling process, I would like to introduce the notion of the body undergoing the same process. Similar to the way in which my virtual studio space (the grid) is an extension of my physical studio, the same CAD software can be regarded as a form of re-tooling the body, as it too becomes a digital prosthetic device in relation to my body. By extending my ability to create from the physical to the virtual, CAD becomes a digital prosthetic device or as Smith and Mora suggest, a

prosthetic territory, a place where human and technology begin to fuse (Smith & Mora 2006:19). In the light of this, I would like to suggest that the process of re-tooling incorporates not only an adaptive process for the object, but also a transformative process for the body.

This then becomes the influence of technogenesis on my own artistic practice as my tools evolve alongside me and undergo forms of re-tooling or evolution. The process informs my tools and the way in which I use them to create new pieces and as a result I find myself moving between digital and nondigital platforms of engagement to produce jewellery pieces. This relationship that I have with my tools (both digital and nondigital) is then illustrated throughout the processes and pieces developed in my practice and more specifically my relationship with these tools begins to embody the prosthetic notions of the posthuman.

1.4 Conclusion

The aim of this chapter has been to outline the historical co-development of the human and technology (technogenesis) in order to establish to what extent technology has transformed our current understanding of craft. I position the process of technogenesis at the foreground of technological development and more importantly as the point of departure for investigating my own engagement with tools. This in combination to the implications of the sequence of industrial revolutions and the notion of an industrial artisan generates a greater understanding of the way in which humankind has ultimately progressed in terms of its relationship with technology. It also offers a point of departure for introducing the influence of technology on my own craft practice and the way in which technology becomes an extension of my own body. In relation to this, technology's continuous alterations and transformations to suit certain processes position the re-tooled object as a device which artists can use to activate a conceptual technogenesis.

By looking at the historical implications of technogenesis, one can see the vast extent of technological integration not only into society, but into the process of making as well. In terms of Sophie de Beaune's and Katherine Hayles's discussions on prehistoric and modern versions of technology, it is evident that the human ability to create tools aids in constructing new environments and innovative tool solutions. As a result, we continue to see the progression of technogenesis, even in the current fourth industrial revolution. At present technology is increasingly subtly becoming fused into general daily activities and is regarded as a basic necessity. Similarly, in my own practice technology is a tool that extends my natural body by enabling me to mould, shape and extrapolate within both a physical and virtual space. Additionally, technology can be regarded as a device which is fluid at its core, as I continue to adapt and modify its functions through the process of re-tooling (Hayles 2012: 17-18).

I therefore regard technogenesis as a formative and informative process that has shaped the way I interact with my tools, as well as my exploration of adapted tools and materials. It becomes relevant in my process of making

as I consciously fuse digital and nondigital tools, exploring prosthetic territories through digital forms of prosthesis. This process alters the way in which I manufacture and ultimately creates new innovative processes, allowing me to further interrogate my relationship with technology in my contemporary jewellery practice. By discussing the work of artists Kathryn Hinton and Ian McIntyre, as well as my own work, I aim to illustrate the notion of the re-tooled object in terms of prosthesis as I identify the pieces I make, and the tools I use to construct them, as extensions of myself. Furthermore, in identifying the re-tooled object as an extension of the human body, I aim to establish my own form of conceptual technogenesis, by constructing jewellery pieces that embody both these prosthetic notions, namely through physical and virtual tools.

Chapter 2: Postphenomenology

2.1 Introduction

This chapter unpacks the role of postphenomenology in my research investigation around the human-technology interface and more specifically positions postphenomenology as a lens through which I can analyse my relationship with technology in my artistic practice. By discussing postphenomenology in relation to my own engagement with my tools, I investigate the role of technology in mediating my own experience of reality during the process of making.

I begin the chapter by discussing the philosophy of phenomenology as expounded by Martin Heidegger and its role in understanding the study of consciousness as experienced by the first person. This provides a foundational framework for the tools I use to investigate the central structures of my own experiences during making. Drawing on the writings of Don Ihde (2003: 4-20) and Peter-Paul Verbeek (2010: 4-29). I introduce the philosophy of technology (also known as postphenomenology) to investigate my own technological mediation and unpack its relevance in my artistic practice. Once I have explained postphenomenology, I introduce the notion of the interface and give my interpretation of this space, framing it as an investigative space in my research. Along with the interface, I discuss the works of artists Darja Popolitova and Corrina Goutos, whose work deals with the intimate relationship that humans have with technology and objects.

This sets a framework for my investigation of the role of technology in constructing various environments in my artistic practice. The chapter aims to establish postphenomenology as an investigative lens that is applied in my research to unpack my technological engagement, while aiding in investigating my own relationship with technology in the process of making. I end the chapter by discussing my own interpretation of the interface and how this relationship influences both my creative process and the pieces that I make. I utilise postphenomenology as an investigative framework in my research to understand the complexities of the interface and the role of the prosthetic within a posthumanist context. I therefore rely on a postphenomenological perspective to explore the boundaries between my own body and the *interface* that I rely on during the process of making.

2.2 Phenomenology: An overview

Phenomenology can be regarded as a philosophy by means of which one can study the structure of consciousness and the human experience of “things” (Thomas 2006: 43). According to Julian Thomas, phenomenology is “a methodology in which the investigator bases their interpretation of a place or object upon their unbridled subjective experience” (Thomas 2006: 43). In other words, phenomenology is a process in which an individual becomes more aware of the self through certain subjective experiences and the meaning attached to certain things/objects in these experiences. British philosopher Galen Strawson states that the self “is certainly (a) a subject of

experience, although it is certainly (b) not a human being considered as a whole" (Strawson in Zahavi 200:39). Strawson suggests that phenomenology is closely connected to ontology in relation to the notion of the self in that "the idea or sense of the mental self is vivid for us" (Strawson in Zahavi 2000: 40). However, this presents a complication in understanding the existence of the self, leading us to ask: "What sort of thing is figured in self-experience" and "Do selves exits?" (Strawson in Zahavi 2000:40). Strawson concludes that "the ontology of the self is not identical to the phenomenology of the self" (Strawson in Zahavi 2000:41), in that the reality of the self is informed through self-experience, but "a self cannot be just what is phenomenally given" (2000:41). Although there are various forms of self-awareness, there is selfhood or a sense of individual identity in self-awareness (Zahavi in Zahavi 2000: 68). Therefore, to a certain degree phenomenology informs ontology in that an individual's experience of their reality informs their understanding of themselves to a certain degree. However, it is important to note that I distinguish between phenomenology and ontology by positioning ontology as an inquiry into self/being, and phenomenology as the inquiry into human experience.

Although this study does not focus on the ontological sense of self, it approaches the self through a phenomenological perspective, unpacking a phenomenological ontology in which my experiences inform my understanding of myself. I argue that my understanding of my experience at the human-technology *interface* informs my understanding of myself as a being. In this regard, it is necessary to provide a brief overview of phenomenology as it is the predecessor to postphenomenology and thus forms the foundation of my further investigation into postphenomenology in relation to the human-technology *interface*. Throughout my study I position the various technologies that I engage with (in the process of making) as objects that inform and otherwise influence my creative process. Phenomenology enables me to approach these technologies as objects – or as Thomas puts it, 'things' – that influence and perhaps transform my own subjective experience of reality. Therefore, I position phenomenology as a methodology by means of which I investigate my experience of technology in my contemporary jewellery practice and unpack the ways in which these technologies transform my understanding of being into what I perceive as a posthuman state. Considering that "object-hood is fundamental for phenomenology as a theory of intentionality" (Arnold 2020: 105), I regard the digital and nondigital tools in my creative process as objects that influence my experience during the process of making. Furthermore, a phenomenological perspective enables me to unpack the ways in which these objects/technologies constitute my sense of self through the ways in which they are presented. As this study is focused on the making of contemporary jewellery, the pieces that I make can also be regarded as phenomenological objects that inform the wearer or viewer; thus, these objects become tools that enable me to confront my subjective experiences at the human-technology *interface* and personify a posthuman state of being.

The term phenomenology was coined by Edmund Husserl in the early 1900s. Husserl first introduced phenomenology as a "substratum of empirical psychology, as a sphere comprising 'immanental' descriptions of psychical mental processes, a sphere comprising descriptions that are strictly confined within the bounds of

internal experience" (Husserl 1983: np). Husserl's approach to phenomenology proved experiential in nature and paved the way for our understanding of phenomenology today. However, when unpacking the philosophy of phenomenology, one must acknowledge the subsequent work of Martin Heidegger. In his book *Being and Time,* first published in 1927, Heidegger introduces his own approach to phenomenology as an investigation into the state of 'being'. According to Heidegger, "'Being' is the most universal and the emptiest of concepts. As such it resists every attempt at definition" (Heidigger 1962: 21). In Heidegger's attempt to define the nature of being, he explains that "Being is always the being of an entity" (Heidegger 1962:29) and that these entities can be regarded as areas, be they nature, language, life or history, and that these areas can thus "serve as objects" (Heidegger 1962: 29). Thomas adds that "science is grounded upon a deeper understanding of worldly things" (Thomas 2006: 47). He suggests that Heidegger utilizes hermeneutics to confront the nature of human understanding, that "understanding is fundamental to all human existence" (Thomas 2006: 47) and that experiencing, interpreting and understanding our environment is not only a "method of inquiry", but "a mode of being" (2006:47). Heidegger draws on hermeneutics to address the nature of human understanding. He believes in understanding as "fundamental to all human existence" (Thomas 2006: 47) and that our experiences, understanding and interpretations thereof become a method by which we inquire into our state of being (Ricoeur 1974:3). Heidegger positions phenomenology as a tool which can be used to address the things that present themselves to us. Phenomenology therefore – according to Heidegger – is not just related to the consciousness, but also the way in which the human becomes a source of intelligence by viewing the world (Heidegger 1962: 51). His belief translates into the possibility of things having the power to reveal themselves to the human through the human's experience in an environment (Thomas 2006: 47).

As my study is focused on my interaction with various technological objects and how they influence my experience, I have chosen to focus primarily on Heidegger's explanations of phenomenology. Heidegger introduces a hermeneutic phenomenology in which he outlines the nature of being as being in relation to things, or as he refers to them, "equipment" (Heidegger 1962: 97). He argues that equipment and its function are almost indistinguishable and that in approaching the object we may be predominantly focused on the function of the object rather than the object itself. It is only if an object fails in its function that we become aware of the object itself (Thomas 2006: 49). Therefore certain objects can be filled with experience and these things could become "objects of intentionality", "providing a bridge between consciousness and the physical world" (Thomas 2006: 46). In his later publication titled *The question concerning technology and other essays* (1977), his approach to ontology shifts to the realms of technology. By opening human existence to the essence of technology, Heidegger hopes to introduce the possibility of experiencing technology within its "own bounds" (Heidegger 1977: 3-4). He explicitly states that "technology is not equivalent to the essence of technology" (Heidegger 1977: 4) and that we are in some ways bound to technology, which in itself it cannot be regarded as a neutral thing:

> According to ancient doctrine, the essence of a thing is considered to be what the thing is. We ask the question concerning technology when we ask what it is. Everyone knows the two statements that answer our question. One says: Technology is a means to an end. The other says: Technology is a human activity. The two definitions of technology belong together. For to posit ends and procure and utilize the means to them is a human activity. The manufacture and utilization of equipment, tools, and machines, the manufactured and used things themselves, and the needs and ends that they serve, all belong to what technology is. The whole complex of these contrivances is technology. Technology itself is a contrivance, or, in Latin, an *instrumentum*. (Heidegger 1977: 5)

For Heidegger this instrumentality is a fundamental characteristic when it comes to technology. As a result, technology is regarded as not a "mere means", but as a way of revealing a space in which the essence of technology will open itself and therefore "It is the realm of revealing, i.e., of truth" (Heidegger 1977: 11-12). It is this revealing nature associated with the object of technology that sparked my interest in this research. I regard Heidegger's discussion around the nature of being and the role of objects without our experience of reality to be a key component of my study. Not only does it set the foundation for my postphenomenological investigation, but it also introduces the core principles of my discussion on technology.

Phenomenology therefore provides a platform to investigate various objects and their relationship with human beings by the way that we experience these objects and the process of 'being'. When I refer to 'being' in my research I am drawing on Heidegger's definition of being. Although Heidegger mentions various approaches to the term in his book *Being and Time* (1962), there is one definition in particular that I make reference to: "Being lies in the fact that something is, and in its Being as it is; in Reality; in presence-at-hand; in substance; in validity; in Dasein (existence); in the 'there is'", but the following statement ties it all together: "Being is always the being of an entity" (Heidegger, 1962, p. 26-29). In this sense, the term 'being', could be associated with a living or non-living entity; and as such could refer to both an object and a human. For this reason, it becomes an interesting point of departure for the study of humans' relationship with technology; if technology can be identified as a being, then in combination with humans it could alter the status of a 'human being', for the human being would no longer be identified as its own entity, but would be in existence in conjunction with technology.

2.3 Postphenomenology

Phenomenological thought forms the foundation of postphenomenology; the philosophy of technology. In its essence it encapsulates the manner in which humans transform their world and make objects that alter the way they experience and make sense of the world, transforming them during the process (Ihde & Malafouris 2018: 197). Furthermore, postphenomenology was established in order to "remedy classical phenomenology, whilst also aiming at reviewing and expanding the classical texts for an updated, more encompassing philosophy of the human experience" (Crystal 2018:300). Postphenomenology thus presents a narrative that validates and essentially includes "modern technology as an extension of the human experience" (Crystal 2018: 300). In his article

"Phenomenology Again?" published in 2003, Don Ihde explains that phenomenology has begun to enter its second century. Ihde aligns postphenomenology with postmodernism, poststructuralism and postindustrialism in its transformation and modification to identify as 'more contemporary' (Ihde 2003:4). Ihde introduces technology with a postphenomenological understanding "as an extension of the self" (Crystal 2018:300) and as a "bodily sensory experience" that is "validated as a tool of formal investigation under classical phenomenology" (2018:300). Thus, postphenomenology presents us with a means to investigate the contemporary technological society and our experience of this society through technology. Alongside Ihde, Peter-Paul Verbeek, a philosopher of technology, suggests that humans and the world around them are interrelated. That they cannot help but be directed by the world around them, as they are always experiencing it in relation to technology and this is the only space where they can realise their own existence (Verbeek 2010:3). Considering Ihde and Verbeek's views and acknowledging the presence of technology in our existence, our experiences of the world through technology becomes increasingly pertinent.

In terms of my practical investigation, the framework of postphenomenology is crucial in unpacking the effects of the human-technology *interface*. I utilize postphenomenology as an investigative lens in my research to establish to what degree the tools that I engage in my creative process may affect my understanding of making. According to Chris Baber, Tony Chemero, and Jamie Hall, the jewellery manufacturing process is a space where creativity, cognition and physical performance meet (Baber et al. 2017: 284). In their article titled "What the jeweller's hand tells the jeweller's brain: Tool Use, Creativity and Embodied Cognition" (2017), they discuss the degree to which technological artefacts affect a jeweller's activity and creativity, and how technology mediates human experience in terms of making. They argue that this takes place through a process of mutual co-construction and that creativity arises from the dynamic interplay between jewellers and their technology (Baber et al. 2018: 284). Although the making of jewellery involves a wide range of techniques ranging from metallurgy, gemmology, cutting, piercing and casting, to name a few, these are craft skills that cannot be separated from design. Thus, the process of designing and making can be regarded as inseparable in that this process enables a sense of understanding of both materials and tools. In their article Baber, Chemero, and Hall explain that it is the collaboration with the tool in combination with design that informs the jeweller's activity (Baber et al. 2017: 284):

> Embodiment relations, therefore, become not only a way of acting but also a way of knowing; with experience and practice, the skilled jeweller is able to anticipate changes in material and to respond to these through changes in the use of the tools and equipment (Baber et al. 2017:288).

In my own practice I have acquired a refined skillset specific to jewellery making and this remains foundational in my manufacturing process. Although my method and materials remain fluid, my understanding of basic jewellery tools are at the core of my making, and influence both my manufacturing processes and the pieces that I construct. Additionally, it is the collaboration between myself and my tools in the processes of designing and making that has led me to explore alternative methods in my art practice. Although my foundation remains set within the parameters

of traditional jewellery making, modern technological innovations such as computer-aided design and 3D printing allow me to explore new methods of making that include but are not limited to digital and virtual spaces. This area of production leads to a transformation of "conceptual spaces" where the unfamiliar unites with the familiar (Baber et al. 2017: 285). It signifies an exchange between myself and the technologies I engage which infiltrates every part of my creative process. This process embodies what Baber et al. describe as "a mutual exchange and co-construction" (Baber et al. 2017:285) of my intention and the effect of the technologies I use and as a result my environment continues to transform through the technologies I engage.

This transformative exchange ties back to the process of technogenesis and simultaneously draws on the philosophy of technology and more specifically that of postphenomenology. Don Ihde explains that "human embodiment is presupposed in and by our technologies, particularly those related to the production of knowledge, including scientific instrumentation, communication technologies, and the new forms of virtual reality, simulation and modelling devices" (Ihde 2003: 5). In my investigation I engage with this notion as I unpack the ways in which the technologies that I engage with in my contemporary jewellery practice inform my experience of making jewellery. Postphenomenology is thus positioned as a lens through which I investigate the extent to which technology could potentially alter my own experience of reality. It enables me to establish a framework which confirms a subjective postmodern approach, in that it focuses on the "intentional relationship between subject and object" (van den Eede 2015:11). In this regard, postphenomenology reconceptualises the intentional relation between subject and object by establishing an indirect relation in which technology functions as a mediator (van den Eede 2015:12).

It is important to note that the types of technology Heidegger discusses in his later works were from the industrial era. Thus, the technologies Heidegger became acquainted with are not comparable with the full scope of the internet and various digital platforms we know today (Hongladoram 2013: 270). Although technology has always been closely related to science, Ihde argues that Heidegger may be correct in claiming that technology predates science in an ontological sense and that ''on the ontological level, Technology is a certain way of experiencing, relating to and organizing the way humans relate to the natural world" (Hongladoram 2013: 271). Heidegger's philosophy of technology investigated the role of tools in the daily interactions between humans and their environment. He considered the human interaction with certain tools as a mode of establishing a relationship with their environment (Verbeek 2005: 100-120)

> When technology (or Technology with capital ''T'' to use it in Heidegger's own sense of emphasizing its ''essence'') is understood as a certain way of dealing with the world, science follows ontologically because science itself is nothing more than a certain kind of activity, one that emphasizes knowledge discovering and making, all for the purpose of mastering the world, but it is the attitude of mastering the world that is already a technological attitude, thus making the latter ontologically prior to the former. (Hongladoram 2013: 271)

The ontological nature associated with technology thus becomes a key conductor in postphenomenology as humans begin to obtain a "relational ontological standing…through a saturated, situated engagement of thinking and feeling with things and form-generating materials" (Ihde & Malafouris 2018: 196).

In terms of my own investigation, I establish myself as the human entity within a specific environment, being mediated by a technological artefact. Whether it be the digital tools I use to model various jewellery pieces, or the saw I use to pierce the metal components combined with my pieces, these technologies facilitate a subjective interpretation of my own experience. I confront my experiences (specifically as artist in the process of producing my jewellery pieces) by looking at how my interaction with various technologies could possibly transform and extend my body as well as my understanding of making. This transformation in turn allows me to consider my own state of being in relation to these technologies. Additionally, I view the technology I engage with as a tool that mediates my own experiences, while also representing a platform from which experience can be constructed and embodied. In discussing this platform, I reference the human-technology *interface* positioning it as a simulation of the virtual object and a projection of reality within a virtual space. This space can also be regarded as a tool by which I engage with various environments; introducing the *interface* as a technological mediated platform (transformative in nature) by means of which I engage with the world. In this regard, the *interface* distinguishes between phenomenology and postphenomenology, in that phenomenology suggests an exchange of knowledge between myself and my environment, and postphenomenology suggests that there is a technologically mediated engagement with the world, positioning the *interface* as a secondary mediated experience that operates in a phenomenological sense.

2.4 The Interface

In this section I introduce the interface as a space in which the human experience and technology intersect. I specifically refer to the human-technology interface, in which the interface represents a transformative space where technology and the human exchange components of themselves, abstracting the original state of the human body and the technological artefact (Hayles 1999: 290). Additionally, it is a space where the boundary between the human and technology is almost indistinguishable (Thomas 2006: 49). In terms of my research the *interface* thus becomes an investigative space where I interrogate my relationship with technology. Though difficult to pinpoint, at the *interface* there are both physical and virtual markers that allow me to distinguish where my body ends and technology begins. Considering that technology can be conceptualised as a mediator between human and environment, technology in some way can be recognised as our connection to our environment (Verbeek 2011: 29). According to Peter-Paul Verbeek, there are four contact points for the human and technology: a) to the hand, b) before the eye, c) behind the back, and d) above the head. 'To the hand' refers to the physical interaction the human body may have with a technological device, such as typing on the keyboard of a computer or moving. 'Before the eye' refers to the cognitive interpretation of information provided by technology, such as seeing a 3D

model on a computer screen. 'Behind the back' refers to the physical infrastructure that influences human action or experience, such as only being able to use my computer when there is power. Lastly 'above the head' "refers to the role technology plays in our thinking" (Verbeek 2011: 29 -30), such as the way my digital tools influence the way I design. Without these four contact points, it would be impossible for me to design 3D jewellery pieces or 3D print them. These contact points are where I engage my tools, and where they become extensions of myself.

According to Ihde, the main difference between postphenomenology and phenomenology is the thematization of materiality, "particularly in the form of instruments and devices by which we make 'worlds' available to us which were previously unexperienced and unperceived" (Ihde 2003: 20). Ihde sums up his description in the following statement: "Instruments are the means by which unspoken things 'speak', and unseen things become 'visible'" (Ihde 2003: 20). I consider this to be rather profound in that it explains an experience I have struggled to articulate in terms of my own work until now. My computer and the CAD software utilised in the process of 3D modelling are both tools (or as Ihde says: devices) that make a virtual space available to me as the artist that was previously[51] unperceived and unexperienced. Without my computer screen and the CAD software I would not be able to see my pieces as they are displayed on a screen in this specific software (on a digital platform) and they remain virtual until I 3D print them. In this regard, 3D printing can be recognised as another tool that reveals the 'unseen' through the printing of a virtual 3D model. My interaction with devices such as my computer, CAD software, my 3D printer, and even my cell phone (which I use to 3D scan objects) mediates my experience of making. Not only do they become extensions of my hands during the making process, but their functions inform my creative thinking.

In my view, the works of contemporary jewellery artists Corrina Goutos and Darja Popolitova illuminate a similar perspective to my own, in the sense that they utilise contemporary jewellery to convey their ideas on humans' relationship with their experience of technology as well as their environment. Goutos's collection called *Objects for the hand* includes a series of rings and sculptures designed to interact with the human hand through the act of holding pieces in the hand or hanging pieces from the hand. Goutos draws on a phenomenological perspective as she explains that our physical encounters construct our understanding of the world. Through our constant adaptation to our changing world, we become aware of ourselves and the surrounding environment. She suggests that we "create memories through touch: growing as one with our surroundings and physically absorbing their attributes" (Goutos 2013: Online). To Goutos the objects and environment that surround us are no longer to be considered 'outside' of us, but rather form part of "the greater entity of self" (Goutos 2013: Online).

[51] In using 'previously' I am referring a time when I made jewellery without the use of these digital tools.

Figure 15: Corrina Goutos, 2013. Souvenir. Cast bronze, forged steel, cement, resin. Digital Image. (Source: Goutos 2013: Online).

Figure 16: Corrina Goutos, 2013. The Caves. Sterling silver, cement, amethyst, cubic zirconia, glass, steel epoxy. Digital Image. (Source: Goutos 2013: Online).

Goutos's collection aims to "interact with the movement and nature of the hand" (Goutos 2013: Online). Each piece resembles an assemblage of materials and a reference to found objects that contain certain experiences of various places. Her piece *Souvenir* illustrated in Figure 15 references the human desire to capture and take some part of a place with us, making tangible that which is not, to render a valuable experience, feeling or place (Goutos 2013: Online). *Souvenir* can be understood to illustrate the intangible experience of consciously/subconsciously carrying a space/place with you. The cement and resin form in the piece, coupled with the brass nuggets and steel like rods speaks to a nuanced experience of a specific yet unknown landscape which contains various mementos that allude to characteristics of the place this piece may represent. Additionally, the way in which this piece interacts with the hand also illustrates as Goutos describes it, the action of ripping a part of the place out of the ground and carrying it around with you as a souvenir (Goutos 2013: Online). I would argue that this piece embodies phenomenological attributes in which the human experience is mediated by objects that embody intangible human experience. Figure 16 titled *The Caves* similarly encapsulates what Goutos refers to as a 'philosophical fable'. Best explained in her own words, the fable originates from *The Allegory of the Cave* (380 BCE), in which Plato explains how we define reality in terms of what we experience with their own sensations, when beyond the constrains of the

conceptual caves we live in, there lies a much broader world of ideas" (Goutos 2013: Online). Goutos plays on the notion of the ideal reality, but simultaneously being prevented from appreciating this perfection as the "sparkling interior details satisfy the wearer's notion of their perfect reality, however the constriction of the fingers prevents them from enjoying the true gems the exterior has to offer" (Goutos 2013: Online). In this way Goutos's collection relates to a phenomenological experience not only through embodying certain experiences within these objects, but the objects themselves initiating new narratives around these experiences. Goutos frames these contemporary jewellery pieces as extensions of the self through making objects that manifest certain intangible experiences, thus transferring what was once intangible into a physical space where the viewer/wearer can interact with a subjective experience in a now objectified manner. In Goutos's work, the focus is drawn to the relationships that humans have with certain experiences which can then be encapsulated in various objects and worn as extensions of the self. I draw a connection between her work and my own body of work as my pieces can also be regarded as extensions of the self, while embodying my own subjective experiences (especially when interacting with technology) and their transformative nature.

Another artist whose work comments on the intimate relationship that humans forge with experiences around technology is Darja Popolitova. In her collection titled *Eros Loading,* Popolitova illustrates what she explains as the intimacy that humans have developed with certain technological artefacts. The pieces in this series can be viewed as a form of what she refers to as "digital animism" as they reference the "animation of non-living objects" (Popolitova 2014: Online) by assigning ontological properties to inanimate objects. Her piece titled *Alter Self 1* (Figure 17) references the manner in which we form identity through the wearing and use of certain technical objects (Popolitova 2014: Online). This piece forms part of a series that was created using digitally infused processes. In this piece alone Popolitova has utilised three digital tools namely, CNC milling, 3D scanning and vacuum forming, all of which form part of her creative process. Based on the structure and materials used in each of these pieces, I deduce that her process involves using these tools collectively, first CNC milling a form that is then 3D scanned in order to vacuum form the plastic. The forms she applies in her work therefore undergo a transformative process before being finalised into her jewellery pieces. Popolitova's work becomes an illustration of the barely distinguishable boundary between the human and technology, confronting the viewer/wearer with what appears to be a technological artefact. In wearing the piece, one constructs a new form of identity that merges with the technological. Her work thus becomes an embodiment of the postphenomenological in altering the viewer's experience of identity. Similarly, her piece *Body Trigger* (Figure 18) aims to explore the intimacy humans share with technical artefacts through touch. Popolitova explains our interaction with these devices as a "sensual choreography of hands" (Popolitova 2014: Online). This piece in particular references the human hand's interaction with smart devices, specifically the manner in which we scroll through a smartphone or tablet. Her video

titled *Hybrid Operandi*[52] demonstrates the human hand engaging with this and other similar pieces in the collection. This piece thus becomes an embodiment of technology as it invites the viewer to engage with it as one would with smart phone. Although the smart phone is considered a technical device in its own right, its function is bound to a subjective physical interaction. Instead, it is presented as a technical object that can be worn on the body, encapsulating the process of engagement one shares with certain technological devices through touch. In some ways one could consider these pieces to be technological artefacts in themselves; after all they do engage with the human hand in similar ways to functional technological devices. Although they are not digital in nature or technological in function, it is the technological aspect embedded within them (through use of materials and tools) that renders them as successful pieces in communicating the indistinguishable boundary, not just between human and technology, but also between technology and technological artefacts. Popolitova's work not only embodies a version of the human-technology interface, but it also literally references the combination of the physical and the digital aspect in that most of her pieces are made using various digital techniques which are then physically translated using rapid prototyping methods such as 3D scanning, CNC milling, vacuum forming, and water-jet cutting, to name a few. It is her collaboration with these processes that allows her to successfully communicate the digital influence on the human body and illustrate the ways in which the body interacts with various technological artefacts.

Figure 17: Darja Popolitova, 2017. Alter Self 1. Brooch. Plastic, silver, steel modelled, 3D-scanned, CNC-milled, vacuum formed. Digital Image. (Source: Popolitova 2014: Online).

[52] *Hybrid Operandi* refers to the collection of a series of objects created by Darja Popolitova. An illustration of these objects is documented through a short video that illustrates the way in which these pieces interact with the body. This demonstration formed part of Popolitova's exhibition *Eros Loading* and can be found on her website: https://www.current-obsession.com/hybrid-operandi/ (Popolitova. n.d.: Online).

Figure 18: Darja Popolitova, 2017. Body Trigger. Pendant. Rubber, lab glass, silver, textile. Digital Image. (Source: Popolitova 2014: Online).

As with Goutos and Popolitova, my own work also makes reference to the experiences humans have around technology by unpacking the human-technology *interface*. Therefore the relationship my body has to my tools and the objects that I create becomes quite relevant in understanding and reading these objects as jewellery pieces. Like Goutos, I am interested in understanding the relationship established between myself and certain objects; however, in my work I focus on the aspect of the tool or technology as an artefact. My pieces become a means of illustrating and documenting my experience of these artefacts and at times the process of investigation leads to a series of design explorations. While interrogating my dependency on certain technological tools, I deliberately sought traditional methods of making. During this time I began to experiment with an unconventional form of wire crochet. As depicted in Figure 19, this process was tested in three parts to develop the final piece. I first began by shaping polymer clay into a hollow form, inserting holes close to the outer rim. Using a thin steel wire, I crocheted a few rows to test a basic crochet pattern. The second test incorporates a piece of copper plate which I manipulated into tube and as with the polymer clay form, I drilled holes towards the edge of the rim. Here I tested a coated copper wire and found that the copper tube allowed for a tighter crochet pattern as the holes were not as fragile as in the polymer clay. My last test was done on a 3D printed PLA part which I designed similar to the polymer clay shape using CAD software and it proved to be the best fit between the metal and polymer clay. I decided to apply this technique on a larger scale using a plastic pipe. The plastic pipe has much larger diameter and I drilled larger holes. Using a thin steel wire, I crocheted a much larger form and could easily remove the form from the tube (Figure 20). This piece would function as both a tool for design form exploration and as inspiration for my *Post-human* series discussed in Chapter 1.

Figure 19: Luché Oberholzer, 2019. Process work. Digital image.

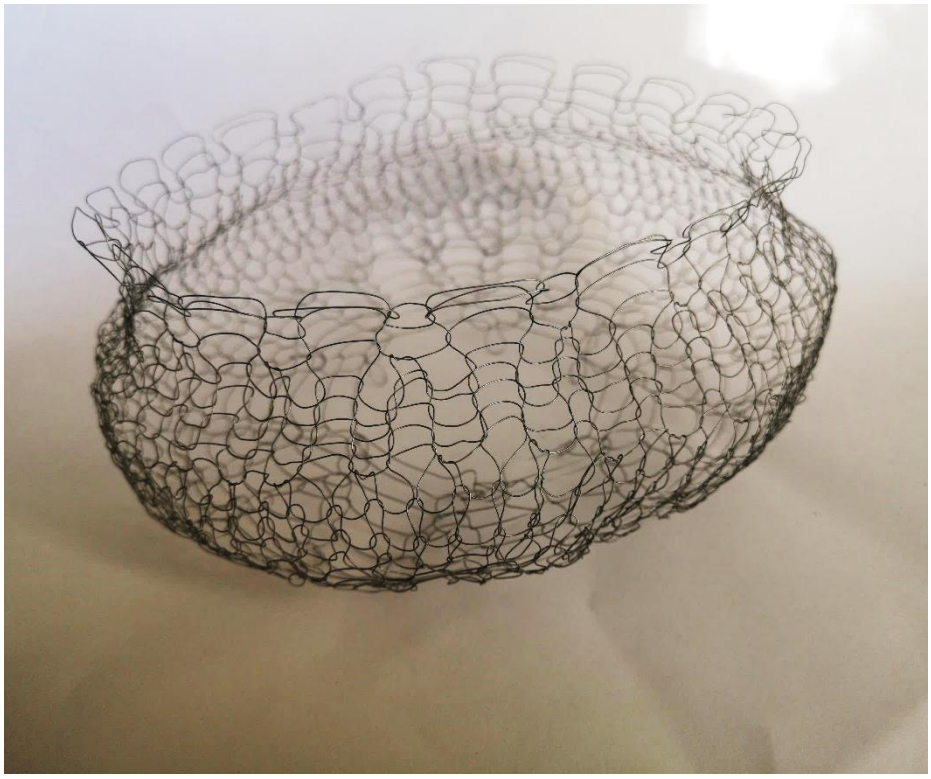

Figure 20: Luché Oberholzer, 2020. Unnamed. Steel wire. Digital Image.

Once this piece was removed from the initial tube, I placed it aside to continue testing other crochet forms. I became interested in the way these objects interacted with my environment and the role they have in my creative process. I decided to utilise these objects as tools to develop new forms for my design process. By simply placing the sculptural component (Figure 20) in natural light, it would cast an array of shadows which I would then capture by hand as depicted in Figure 21. As time passed, the light changed and impacted on the forms cast onto the paper and so I managed to capture three sets of patterns (Figure 22).

Figure 21: Luché Oberholzer, 2020. Process. Digital image of shadows cast by a wire sculpture.

Figure 22: Luché Oberholzer, 2020. Scattered Composition. Digital Images of forms captured during shadow play.

I then translated these forms into 3D models, but in order to further investigate this process of taking my experience from the physical into the virtual, I decided to document this transformation. In doing so I strapped a pen to my mouse which would then record the movement of my hand as I created a form. I would document each 3D model I translated as individual blueprints, which would then render yet more forms to explore. Figure 23 depicts a rendering of a 3D model constructed in CAD software and Figure 24 is the blueprint that documents the construction of this same model.

Figure 23: Luché Oberholzer, 2020. Model 1. Digital Rendering of a 3D model.

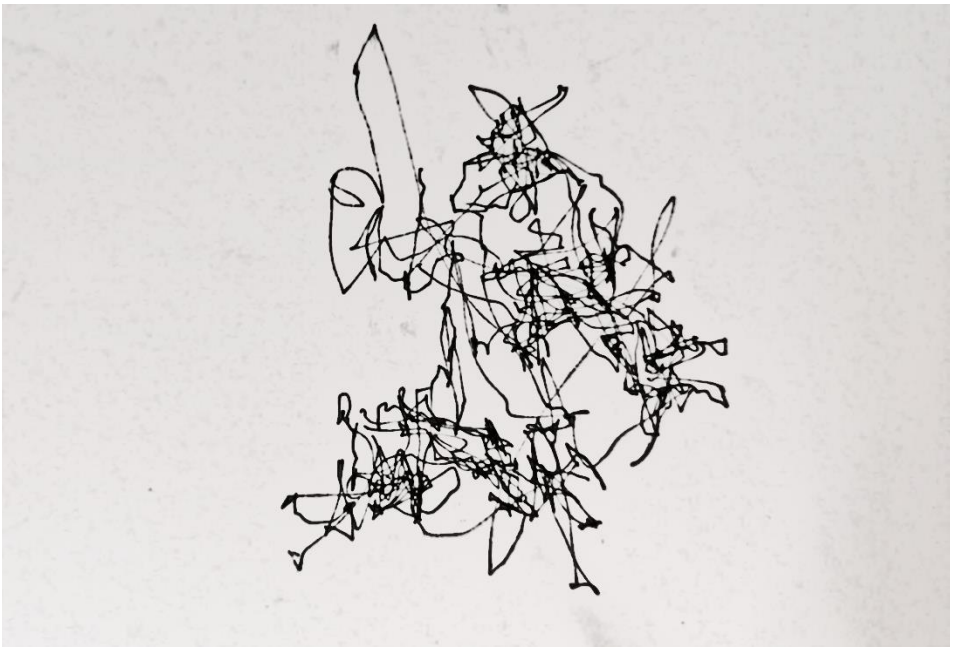

Figure 24: Luché Oberholzer, 2020. Model 1 Blueprint. Digital image of pen strokes made during construction of 3D model.

Figure 25: Luché Oberholzer, 2020. Collection of models. Digital Rendering of a 3D models.

I completed a collection of 3D models (Figure 25), capturing a few blueprints as I constructed them virtually. I regard the process of making these models as a collaboration of both the physical and the virtual, and by capturing a blueprint I extract a fingerprint from the interface. These blueprints in themselves can be read as compositions, or explorations of form; however, they are also tangible evidence of my virtual experience. Although the blueprints captured in my investigation form a part of the process for new form explorations, they are also compositions that document a two-dimensional map of either my own bodily movement, or the movement of a physical piece. Thus, these maps become an integral part of my investigation. By then scanning these maps and projecting them onto a wall, I create a space that references the *interface* where the viewers can physically submerge themselves into my virtual depiction of the *interface*. This then becomes an immersive installation where the viewer can either travel

through the virtual *interface*, illustrating the presence of human interaction with the virtual, or it can be viewed as a space where the viewer can become the wearer. As individuals step in front of a projection, these maps are projected onto their bodies and thus they become the wearer of a virtual jewellery piece. This process illustrates how technology impacts on the human body and has the potential to extend or alter the body virtually.

2.5 Conclusion

The aim of this chapter has been to introduce postphenomenology as the theoretical framework in my investigation of the human-technology *interface*. I position postphenomenology as a framework by which I investigate the relationship that I have with technology, specifically in the process of making jewellery. Postphenomenology renders the *interface* an investigative space in which I can accumulate markers that pinpoint where I interact with technology and how this influences the body and my own experience of making jewellery. In addition to being a reductive tool, postphenomenology is presented as a lens through which I am able to gain a deeper understanding of the manner in which technology influences and transforms my experience of reality during the process of making. Although the boundary between the human and technology is almost indistinguishable, the *interface* can be defined as a space where the boundary becomes tangible.

By unpacking phenomenological attributes and the ontological properties of certain objects, one can see the role 'things' play in the construction of consciousness. In relation to the process of technogenesis, the transformative exchange between human and technology becomes evident. In terms of Don Ihde's and Peter-Paul Verbeek's discussions on material mediation and postphenomenology, the role of technogenesis becomes apparent as technological objects largely influence the understanding of self. Additionally, technology becomes a mediator of our understanding of reality, thus influencing the way in which we engage with these same technologies. As I engage with technology (in my own conceptual technogenesis) to create various jewellery pieces, these objects inform my understanding of making jewellery. These technological tools become an object of subtle transformation in my creative process. In this regard, technogenesis and postphenomenology share transformative properties in their engagement with the human consciousness, as such allowing, my body to adapt to transformations in the context of technogenesis, alongside the intangible shifts in my own *interface*. The *interface* thus becomes a space which I engage as I make jewellery, but is not limited to the physical as it moves between the virtual and the physical, rendering an exchange of experiences facilitated by the *interface*.

In conclusion, I regard postphenomenology as an investigate framework that allows me to access the *interface* as an investigative space, while simultaneously unpacking my own conceptual technogenesis. This space becomes vital to my investigation as I interrogate my interactions with technology during the process of making jewellery. Postphenomenology positions technology as a mediator not only in my experience of making, but also my experience of self. As I engage certain technological devices, the *interface*, the boundary between my body and

technology becomes almost indistinguishable. This alters my human body and my understanding of making jewellery as these tools become extensions of myself. By discussing the work of artists Corrina Goutos and Darja Popolitova, I aimed to convey the ways in which an interface can be illustrated and embodied in an artefact, specifically jewellery. Additionally, as I illustrate and encapsulate my findings from my own investigation in my jewellery pieces, I aim to define the *interface* as a tangible space that can be accessed and understood.

Chapter 3: Techno-Jewels

3.1 Introduction

In this chapter I discuss the role of contemporary jewellery in my art practice, specifically with regards to the role of jewellery design and production in my exploration of the human-technology *interface*. By investigating contemporary jewellery as a medium for self-expression, alongside the ability of the jewellery object to function as a tool (within the context of technogenesis); I begin to unpack the ways in which contemporary jewellery can be utilised as an extension of the body, and as such, possibly be regarded as a prosthetic device. I begin the chapter with an overview of contemporary jewellery and its role in the construction of identities. Drawing on the writings of Liesbeth den Besten (Deckers et al 2017) and Wilhelm Lindemann (2011), I discuss contemporary jewellery as an object loaded with symbolism, whilst explaining my own application of the medium and how it can be utilised as a tool both literally and figuratively. I then explore the notion of jewellery as technology, discussing the writings of Nantia Kouliduo (2018: 18-22) and Katja Prins (2019: 4). I continue to position my own work as both contemporary jewellery and technological devices, discussing the possibilities of techno-jewellery and its role in my own body of work. As I continue to explore the *interface* that I rely on to create, I unpack the ways in which it influences me, whilst I investigate the possibility of the objects (that I generate at this *interface*) becoming an extension of my own body.

I draw on the writings of Marquard Smith and Joanne Morra in their book *Prosthetic Impulses* (2007), in order to give an overview of the use of prosthetic devices and their relationship with the human body. I position the contemporary jewellery that I create as an extension of my body, arguing that jewellery collaborates with the body in the same way as a prosthetic device does. I extend this discussion by referring to the work of artists Christoph Zellweger and Maria Ignacia Walker alongside my own work in order to illustrate the role of contemporary jewellery as a medium that can convey my ideas on prosthesis.

The chapter therefore aims to address the function of contemporary jewellery as a medium, while positioning it as a tool that can communicate various discourses on the body. In essence, I redefine the role of contemporary jewellery in my own practice as not only an object to be worn on the body, but a device that can extend my own body and simultaneously become a part of my body. I argue that this restructuring of jewellery in association with the body is the foundation for the posthuman self in terms of my own processes.

3.3 Jewellery as Technology

The increasing development of technology that can be scaled down and now worn on, or even in the body, opens new possibilities for contemporary jewellery designers to explore their jewellery practices in relation to the digital

landscape. In addition, contemporary jewellery can be seen as having a role in the valuation, understanding, highlighting and amplifying of the body (Koulidou 2018: 18-19). In her article "Why should jewellers care about the digital?" (2018), Nantia Kouliduo states that "jewellers have a deep understanding of how personal objects vehiculate and materialise identity" (Kouliduo 2018: 19). Kouliduo poses the question of how the digital could aid in understanding the self, and asks whether it has the ability to assign value to the body (Kouliduo 2018: 19). Kouliduo focuses her discussion on wearable technology such as smartwatches, rings, necklaces etc.; however, she presents an interesting argument regarding the role of digital jewellery or technological jewellery as an enhancement of the human body. Furthermore, "jewellery often functions as a symbol of self, [and] as a signifier of aspects of identity" (Wallace in Kouliduo 2018: 22) and can thus be utilised as a tool through which contemporary jewellery designers can "engender interactions [that are of] emotional significance to the wearer" (Kouliduo 2018: 21-22). Kouliduo goes on to explain that in the contemporary jewellery designer's creative exploration, "the digital becomes another medium to incorporate into their practice" (Kouliduo 2018: 21 -22). Therefore, the role of jewellery is reconsidered as that of an object that could potentially "expand its social role to act as a symbol of self and become a mediator to connect with others through the integration of digital technologies" (Kouliduo 2018: 21 -22).

Whereas not all my pieces are necessarily identified as digital jewellery pieces (in the sense that they rely on digital technology to function), they have digital footprints in their structure (in the sense that they were made through the use of digital tools). However, what is notable in Kouliduo's article is her account of the integration of technology in a contemporary jewellery practice, as well as the jewellery piece itself. In my own contemporary jewellery practice I draw on this integration, as it informs my creative process. Technology is not only incorporated into my contemporary jewellery practice as a tool, but also manifests in the actual jewellery pieces as well. It is this characteristic that I engage with during my own artistic practice as I utilise contemporary jewellery as a medium to communicate my ideas. It is this same characteristic that allows me to position contemporary jewellery as a tool that can be used both literally (by making jewellery pieces that can function as tools), and socially (by encapsulating technological fragments into my jewellery pieces).

Artist Katja Prins wrote in her Master's dissertation titled *Becoming without being present?* (2019) that during her research she began to question the state of the human body in relation to the technological objects that surround it. Where she had previously considered artificial technology to be separate from humans, she is now confronted with the many similarities between the two, which has led her to question whether they could be rendered hybrids (Prins 2019: 4). Drawing on the works of Peter-Paul Verbeek she began to adjust her view of technology as being opposed to the human body and instead embraced the notion that humans could be "technological by nature" (Prins 2019: 4). Her question closely relates to my ideas at the end of the previous chapter, namely that "the clear distinction between the natural and the artificial is not easy to draw" (Prins 2019: 4) and thus she poses the question of whether technology could also be considered a living entity.

I think Prins's work illustrates the ways in which contemporary jewellery generates discussions around bodily discourse in that her work interrogates the state of the human body in relation to its surroundings. More specifically Prins utilises contemporary jewellery as a tool to communicate her preoccupation with the transformative nature of technology. In her collection titled *Hybrids* (Figure 25) Prins combines dental resin with chrome-plated brass to create a series of contemporary jewellery pieces. Each piece makes reference to the body as an "alternating landscape with sloping transitions and undulating contours determined by the muscles" (Prins 2014: Online). In this series Prins aims to interpret various associations that are visually connected to the human body. She reconstructs these forms on a smaller scale, each piece a combination of artificial materials associated with the medical field (chromium-plated brass), and various medical instruments. By using these materials, she comments on modern views on the human ability to 'intervene' in the body by means of surgery and other invasive procedures. Her aim is to employ her contemporary jewellery pieces to celebrate what she suggests is "an often-neglected beauty of the body, in relation with the efforts people make for its perpetuation" (Prins 2014: Online). Prins's *Hybrid* collection successfully communicates the power of contemporary jewellery to confront certain discourses. Not only do her pieces illustrate a bodily discourse, but they present and transform the body (as Zellweger suggests) into a conceptual arena. Through her alternative use of materials, Prins establishes a deliberate disassociation from traditional jewellery, yet simultaneously the presence of metal makes reference to both jewellery and the medical industry. Prins's work is perhaps a literal example of the human body and contemporary jewellery intertwining not only through the action of wearing her pieces, but also in the materials used in the construction of the pieces.

Figure 26: Katja Prins, 2014. Hybrid 04. Brooch. Chrome plated brass, dental resin Digital Image. (Source: Prins 2020: Online).

In the light of Prins's findings I would like to suggest that contemporary jewellery as an object in close association with the body could be considered a form of technology as well. However, in order to introduce contemporary jewellery as a tool in my research I must first address the manner in which I approach the process of making and wearing jewellery. As I established in Chapter 1, my method of design is adapted to the technology I use; more so, my understanding of making jewellery is informed by the physical and the digital. In my design and manufacturing processes I engage with what I perceive as a hybrid of digital and nondigital techniques, in the sense that I alternate between the physical and the digital. Although most of my pieces are 3D modelled and later 3D printed, these pieces still need to be finished off by hand and physically assembled at the bench. My approach to my tools (both digital and nondigital) is thus dynamic as I draw on both digital and nondigital techniques to make my jewellery pieces. Beyond the physical process of making jewellery, my work is constructed with the intention of generating a conversation, as each piece contains fragments from my investigation into the human-technology *interface*. Therefore, I present my jewellery pieces as a by-product of my investigation and as such encapsulate the working of the *interface* within each piece. As my aim is to establish a connection between the process of engaging with tools in order to create jewellery, and the possibility of the jewellery piece itself becoming a tool, I must first unpack how contemporary jewellery as an object could be regarded as a tool. Prins states that there came a time where she realised everything around her was in some way related to her body and that even though these objects that surrounded her did not possess any organic properties and looked nothing like her own human body, they were in fact operating as extensions of her body (Prins 2019: 2). Furthermore, Prins highlights this investigation into her own body in relation to her environment when she states that:

> Whilst the body is fragile, warm and soft, I realised everything around me is solid, hard, square, cold and stiff. I felt juxtaposed to it but at the same time I also felt extended, unable to function properly without it. (Prins 2019: 2)

In this regard, Prins challenges her own human body's boundaries in relation to its surroundings (Prins 2019:2). Even though there is a sense of discomfort and disconnect with the nature of materials in her environment, she highlights that there is also a sense of dependency. In a phenomenological sense her remark reinforces the mutually informative relationship between her own body and her environment. Considering that jewellery can be regarded as an object proximate to the human body when worn, and additionally portraying certain aspects of identity, it seems apparent to position jewellery as an object/tool that has the ability to extend the human self (Interview: Christoph Zellweger 2017). In my own work, my contemporary jewellery pieces can be regarded as tools that could be utilised as a means to illustrate certain ideologies specific to the body. In my series *Industrial artisan,* my pieces embody various signifiers relating to my research, in that each material component in my pieces is specifically linked to findings in my investigation.

Figure 27: Luché Oberholzer, 2020. Industrial Artisan 1. Pendant. 3D-printed PLA, oxidised silver, coated copper wire, and leather cord. Digital Image.

Industrial artisan 1 (Figure 27) is a combination of 3D-printed PLA, oxidised silver, crocheted copper wire and leather cord. The artificial 3D-printed plastic references the presence of technology, while the crocheted copper wire references the *interface* where the human and technology intersect with the grid (as mentioned in Chapter 1). The oxidised silver is a reference to both the machine and the human body, the process of oxidisation signifying a transformation, and lastly the leather cord makes an association with the skin of the human body, symbolising the human element within the piece. Together these materials engage a conversation in which they illustrate the process that is initiated at my *interface*. *Industrial artisan 1* embodies the subconscious tension between human and technology through the juxtaposition of the hand-made and the machine-made. This piece quite literally illustrates two aspects of my experience around making and positions the digital and nondigital as rivals, yet simultaneously as components fixed together. This speaks to my process as I move between digital and nondigital spaces to create my pieces and addresses my own frustrations within each of these spaces. The smooth texture coupled with the firm shell of the PLA (to the right of the image) references the confidence and ease that I experience with digitalised aspect of my work. The crocheted component (to the left of the image) references my imperfect nature within the nondigital space and contains remnants of the human touch in a rather malleable crocheted wire structure which is trying to mimic the digitalised form. By placing these components opposite each

other, I reference a mirroring of my two creative environments and in fixing them to the silver bars I illustrate the ways in which these two environments have become inseparable and somewhat co-dependent within my praxis. In relation to the body this pendant becomes a communitive tool that embodies the complexities around the human technology interface. Each component appears to be presented separately from the other, but they are fused together into one piece, illustrating the once intangible boundaries within the *interface* now visible and interactive to the wearer. *Industrial artisan 2* (Figure 28), similarly communicates the ideologies around my investigation into the interface as the two components that were once separated and juxtaposed are now merged into one form. By connecting the wire crochet form to the PLA part, I reference the ways in which the digital and nondigital become integrated within this piece and my art practice. This illustrates both processes as extensions of the other: the digital becoming an extension of the nondigital processes and vice-versa. As these pieces are a result of my investigative process, it is important to note that the 3D-printed components used in this series are fragments taken from the original form. Thus, they resemble a combination of parts assembled to create a new object entirely. This series also becomes an embodiment of the industrial artisan as introduced by Glenn Adamson (discussed in Chapter 1) in that it illustrates a development of craft and a merging of craft and technology through incorporation of 3D printed parts and crocheted wire.

Figure 28: Luché Oberholzer, 2020. Industrial Artisan 2. Pendant. 3D-printed PLA, oxidised silver, coated copper wire, and leather cord. Digital Image.

In combining these materials with the techniques such as crochet, metalsmithing, 3D modelling, and 3D printing, I aim to create a visual hybrid of materials and techniques (digital and nondigital) to serve as a visual reference to the industrial artisan. All these factors become vital in communicating my findings through an object; correspondingly by wearing these pieces the body itself begins to interact with a device which embodies a variety of technological remnants. Thus, the body is invited to engage with the techno-jewellery device[53] (an object that is manufactured using a combination of digital and nondigital techniques and materials) loaded with allegorical fragments.

3.4 Prosthetic Devices

> With every tool man is perfecting his own organs; by means of spectacles he corrects defects in the lens of his own eye; by means of the telescope he sees into the far distance. Man has become a kind of prosthetic god. (Freud in Sussman and Joseph: 2004: 617)

According to Marquard Smith and Joanne Morra, the desire to engage with the prosthetic relates to the manner in which the metaphorical and material narratives initiate thought on the conceptual and historical boundaries between human and posthuman, the body and its "accompanying technologies" (Smith and Morra 2007:3). Correspondingly the prosthetic moderates a series of binaries such as self/other, global/local, male/female, body/technology, and public/private, to name a few. Although the prosthetic is often used as a general term to explain the ways in which the body interacts with technology, "both the prosthesis and the body are generalised in a form that denies how bodies can and do take up technologies of all kinds" (Soobchack in Smith & Morra 2007: 20). This generalisation can lead to the notion of the prosthetic becoming a vague and unwarranted term which becomes expansive rather than reductive in technoculture, in the sense that the prosthetic can refer to a number of ideas (Soobchack in Smith and Morra 2007: 21). Therefore, it is important to note that in my own research I address the notion of the prosthetic and the way in which foreign objects – in their collaboration with the body – can be regarded as an extension of the body both literally and metaphorically. This becomes more obvious in my series *Techne,* where certain pieces (Figure 13 and Figure 14) function as ceramic tools and jewellery pieces. *Techne 4* and *5* are both pieces that can be worn on the body and become extensions of the self; however, they become a literal extension of the body in their function as tools. Similar to the way contemporary jewellery could be regarded as an extension of the self as it constructs identity in its association with the body, the prosthetic can be seen as a physical extension of the body, but also a figurative extension of the self in that my jewellery pieces suggest the transformative nature embedded within the *interface.* By the wearing of my jewellery pieces, the bodily boundaries are challenged through the presence of foreign objects. My series *Hybrid* and *Industrial artisan*

[53] In my research I refer to the techno-jewellery device as a jewellery piece that has been constructed through a hybrid of digital and nondigital techniques, and thus encompasses materials that relate to both the digital and nondigital. Considering that my body of work is comprised of pieces that illustrate this hybridity, I refer to my own jewellery pieces as techno-jewellery.

reference the collaboration of the human body and tool, but when the items are worn they can be regarded as foreign objects in relation to the body and a rather subtle approach to disrupting[54] the body's boundaries. My series *Grid* (Figure 34) becomes a more obvious approach to disrupting the body and exaggerates the presence of the digital as a prosthetic presence (the digital as an extension to the human body) in relation to the body. My jewellery pieces serve not only as physical extensions, but also as virtual extensions of the body. This is illustrated in my series *Digi-print* (Figure 39-41), which is comprised of virtual jewellery pieces that can be accessed through the scanning of a QR code with a smart phone. These pieces become visible through the camera on a smart phone by means of an augmented reality[55] and can be virtually manipulated and positioned within a space or on the body. This series embodies the fluidity of the digital space in which I create, in that the interaction with each piece depends on the viewer/wearer and is manipulated and positioned according to the individual operating the smart phone. In this regard, my jewellery pieces serve as physical and virtual extensions to the body. Furthermore, I consider these extensions as devices that shift the wearer/maker's body into what I perceive as the posthuman state. Thus, my techno-jewellery devices can be regarded as infringing upon the body's boundaries, in that they disrupt these boundaries by seemingly extending the body in a virtual manner.

In his article "Material Typographies" (2014) Professor Neil Forrest describes craft as the one of the main drivers in material culture and adds that craft can therefore be considered a cultural prosthesis (Forrest in Steinvåg and Borda-Pedreira 2014: 39 -40); this is because "craft mirrors a type of knowledge used by the cognitive system to overcome the limitations on working memory and thinking" (Clark and Estes 1998: 5), thus positioning it as a cultural extension utilised for problem solving. Alphonso Lingis adds to this as he makes reference to material culture through prehistoric stone tools, stating that even at that time humans in some way perfected these tools through "form and refinement of detail" (Lingis in Smith and Morra 2007: 74). He goes on to say that humans made use of their own bodies to create art and that they adorned their bodies with various found objects which at times consisted of bones and shells (Lingis in Smith and Morra 2007: 74-75). Lingis suggests that through our desire to achieve some sense of perfection, we add to the body, hoping to create a sense of balance and wholeness. Thus, our urge to create prosthetic devices can be regarded as a primal instinct (Lingis in Smith and Morra 2007: 76). Correspondingly, Elizabeth Grosz argues that the human body is possibly a product of something that could be regarded as outdated in that history "cannot be contained in culture alone", but that there are "social, economical, geographical, and representational practices that surround and sustain bodies" (Grosz in Smith and Morra 2007:187).

[54] I chose to use the word 'disrupt' to exaggerate the ways in which jewellery objects can alter the human body's natural contour. These pieces add to the existing contours of the body, and in many ways alter the human body as they become extensions of the self.

[55] "Augmented Reality (AR) technology is a technology that combines virtual information with the real world. The technical means it uses include Multimedia, 3D-Modelling, Real-time Tracking and Registration, Intelligent Interaction, Sensing and more. Its principle is to apply computer-generated virtual information, such as text, images, 3D models, music, video, etc., to the real world after simulation. In this way, the two kinds of information complement each other, thus achieving the enhancement of the real world" (Chen et al 2019: 1).

> This history "begins" with the most primitive use of tools, tools that in the first instance are parts, and then are extensions, of the body itself, and above all, of its privileged organs and functions: cutting, chopping and grinding – tools modeled, at the outset, on teeth, and prosthetic cutting. (Grosz in Smith and Morra 2007:189)

What Grosz is describing here refers back to technogenesis (Chapter 1), inevitably positioning the nature of a tool as an extension of the human body, thus rendering it an inherent prosthetic device. Although this primal instinct is subconsciously woven into the nature of our being, the current representation of the prosthetic is now enabled by various postmodern technologies. Today we interact with various technologies which can be regarded as extensions of our physical bodies (Manovich in Smith and Morra 2007: 204). In his essay "Visual Technologies as cognitive prostheses", published in *Prosthetic Impulses* (2007), Lev Manovich introduces the concept of cognitive prosthesis. Manovich references J.C.R Licklider's 1960 article "Man-Computer-Symbiosis" in which he suggests that the computer becomes a form of cognitive prosthesis in the way it "augments our memory, perception, decision making, and other cognitive operations" (Manovich in Smith and Morra 2007: 204). Licklider identifies the computer as a prosthetic device for the mind: "Today practically all cognitive work - from architecture and finance to scientific research and design – involves the use of these new metaprostheses" (Manovich in Smith & Morra 2007: 204). This alludes to the idea that every object or thing we as humans interact with can be considered a prosthetic device as it extends us in some way or another. Today technology not only physically extends the human body, but as Licklider had predicted, it has become a cognitive prosthetic device. Manovich adds to this as he illustrates the history of technology and its role as a prosthetic device in human culture:

> It is well known that technologies have historically provided and continue to provide the models according to which people imagine the mind. In the 17th century it was the clock; in the 19th century, the motor; and in the second half of the 20th century, digital computers. (Manovich in Smith and Morra 2007:211)

These devices that Manovich mentions are products of human invention and can be regarded as forms of prosthesis in relation to human culture in that they extend the human ability to read time (the clock), automatize processes (the motor), and engage with a virtual platform (digital computers). Considering these technological developments, it seems evident that humans have been creating prosthetic tools throughout history by drawing on systems closely related to the body. Furthermore, these systems which can be translated into prosthetic devices, enable humans to gain a better understanding of themselves. In the light of this, I am confronted with the idea that my tools both digital and nondigital can be considered forms of prostheses and thus indefinably become extensions of my own physical body and mind. In correspondence to this, the contemporary jewellery pieces that I make also become prosthetic devices by their association with the prosthetic tools used to construct them, and their ability to communicate this discourse in relation to the body.

Figure 29: Luché Oberholzer, 2020. Crochet Hooks. Digital Image of Oberholzer's collection of crochet hooks.

Although I predominantly engage with digital tools in my contemporary jewellery practice, there are certain tools that I utilise specifically according to the materials I engage with. In this regard, I associate certain tools with certain materials. An example of this is the crochet hook (Figure 29), which is traditionally used to manipulate wool, thread, or wire into various patterns. Another example is the jeweller's saw (Figure 30), which is conventionally used to pierce and saw various forms out of metal. Each of these is an instrument applied in combination with the human hand to manipulate specific mediums, and without them the human hand would not render the same results. Figure 30 depicts a set of my own nondigital tools, specific to working with various alloys. Each of these objects is activated by the human hand applying motion with the intention to alter a piece of metal. Thus, each of these tools is a literal extension of my own hand when I hammer, saw, hold, or apply texture to a piece of metal.

Figure 30: Luché Oberholzer, 2020. A collection of nondigital tools. Digital image of Oberholzer's collection of analogue jewellery manufacturing tools.

While I engage with these and other related objects quite often, the technology I rely on the most is identified as a digital tool. Figure 31 is a screenshot of the computer-aided design software I use to 3D model various pieces in my practice. This image illustrates the virtual studio space (the grid) in which I create. Although this is a virtual platform, I identify this software as a digital space in which I apply various virtual tools to form components of my jewellery pieces. In combination with these virtual tools, I make use of a mouse, screen and keyboard (general desktop items) in order to access and work within the virtual space (the grid). The grid becomes a platform for virtual engagement, divided into four viewports; it can be accessed from above (2D), in front (2D), to the side (2D), and in a three-dimensional perspective view, all of which work in unison to produce a model. Once you create in a certain view, the other views change accordingly. Thus, the grid can be regarded as a digital extension of my body, along with the screen as an entrance for the gaze, the mouse as an extension of my hand within a virtual space, and the keyboard as an extension of my words as I type commands to activate certain tools. Each of these components works in unison to create a form of digital prosthesis.

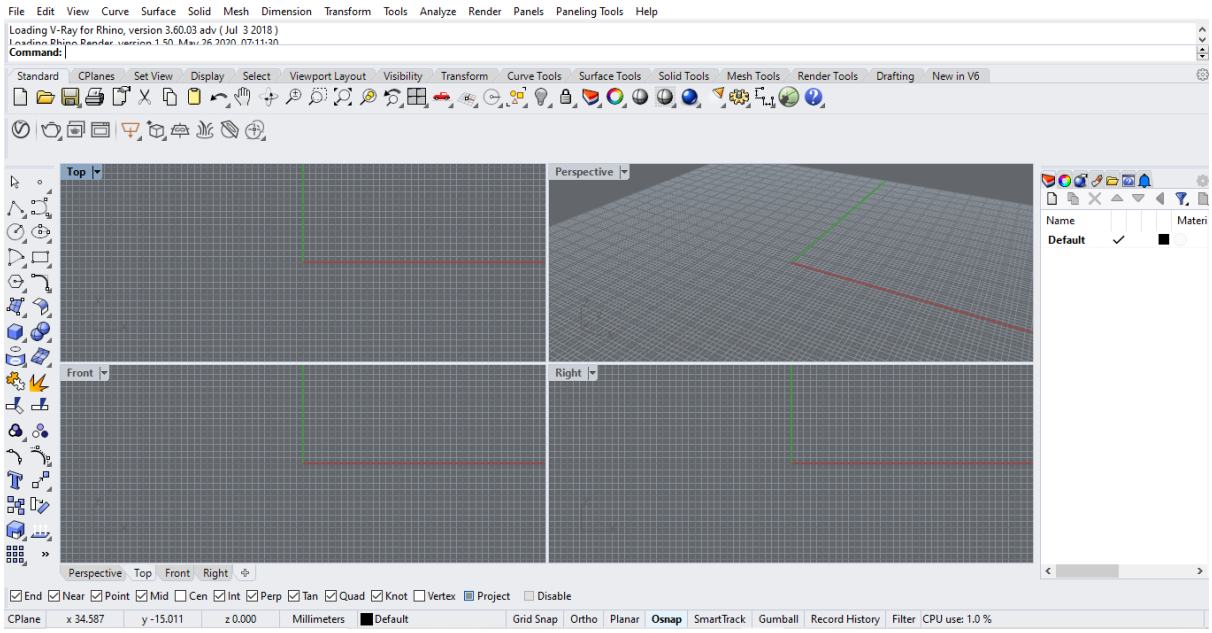

Figure 31: Luché Oberholzer, 2020. Rhinoceros 6.0. Screenshot of computer-aided design software's interface.

Although conventionally the role of the prosthetic is to replace a missing part of the human body with an artificial one (Smith and Morra 2006:2), in terms of this study I position the role of the prosthetic as an extension and potentially an enhancement of the human body. Throughout my creative process I identify both the digital and nondigital tools that I use as artificial extensions constructed through the process of technogenesis. As a result, these tools, digital and nondigital, can be regarded as an extension of my body as I create pieces within a physical and digital space. Therefore, these tools form an intricate part of my artistic practice serving as extensions of my body by enabling me to manipulate certain materials in ways that my hand could not. As I continuously move between these two spaces, I am able to manipulate a diverse set of materials, and although these technologies are vastly different in terms of my engagement with them, I consider them both as forms of prosthesis in extending a creative ability that supersedes what my hand can achieve. Additionally, as much as my tools become an extension of my own body through collaboration, as in their passive state they operate apart from the body, it is only through the tool's interaction with the hand that it is activated and can function as a form of prosthesis in relation to the body. These tools, then, rely on human interaction to develop further through the process of technogenesis. In this sense the object is dependent on the relationship between the human and technology, to some extent, for the tool to develop and to be transformed into new versions of itself. Such a process relies on the presence of the human body to determine the ways in which the tool must transform and develop. As a result of technogenesis, the boundary between hand and tool becomes increasingly difficult to distinguish, as this co-dependency between body and tool can be seen to increase. This is especially relevant in terms of my own practice, as I continuously confront my dependency on my tools, both digital and nondigital. Consequently, the tools (objects) could thus be rendered as foreign, in relation to the body, but through collaboration they become activated as tools that extend the body.

In terms of my own work, this is illustrated by some of the pieces that I make, as I manufacture both jewellery pieces that can be worn on the body and can also be operated as a tool. At first sight the piece can be identified as a jewellery piece, but by wearing it and in relation to the body it functions as a tool in my craft. This notion becomes a key factor in the following chapters, as I unpack the role of these technological devices that I create and the way in which they can be regarded as both technology and jewellery. Hence, the pieces I create are not all centred on tool construction, but instead become objects that embody and illustrate the relationship the prosthetic has with the human body and ultimately how this relationship disrupts bodily boundaries, and thus aids in the construction of the posthuman state.

Pertaining to the relationship between the human body and the prosthetic, I reference my series titled *Techné* (discussed during Chapter 1), in which I constructed contemporary jewellery pieces that can also be used as tools in the process of working with clay. As I have previously established, both these pieces are also jewellery objects that can be worn on the body, while they are also tools that can be used to manipulate clay. In this series I aim to establish contemporary jewellery as a functional object that can extend the body through both form and function. Furthermore, as objects with dual properties, they embody a subtle reflection of the prosthetic enhancement to the body. This idea is not far from that of many other artists who have created certain artefacts which engage and transform the human body. Artists such as Christoph Zellweger[56] (Figure 32) and Maria Ignacia Walker[57] (Figure 33) also explore the role of the prosthetic in transforming the human body.

In his essay "Foreign Bodies/Jewellery as Prosthesis" (2008) Zellweger states that in the modern age humans have embraced the notion that their bodies do not have to stay in their original form, and that they can invest in their bodies by improving their functions and enhance their appearance. As a result of the increasing prevalence of plastic and reconstructive surgery, the human body has infinite options in terms of enhancing or transforming its physical features. These transformations of the body redefine a human's identity and their option to create new identities (Zellweger 2008: 10). In his collection titled *Foreign Bodies,* Zellweger unpacks the body's relationship with 'bio-compatible' objects that can be medically implanted into the body. His pieces visually reference various medical implants, but are adorning objects worn outside of the body, unlike the implanted objects they make reference to (Zellweger 2008:11). Figure 32, however, depicts an 'artefact' containing ancient bone fragments with a customised surgical steel fitting. This piece forms part of a collection displayed in the Swiss National Museum, an addition to the archaeological display of a burial site. These objects (now rendered artefacts) establish

[56] Christoph Zellweger is a Swiss-based contemporary jewellery designer who began his training as an apprentice goldsmith to Wilhelm Reindl. Zellweger then completed his Master's in Fine Arts at the Royal College of Art in London, where he radically shifted his jewellery making to a space that promoted "interdisciplinary and radically experimental practice" (Christoph Zellweger: n.d.).

[57] Maria Ignacia Walker is a trained jeweller whose interests are embedded within the expression of the human body, which she explores through various artistic disciplines. Her approach to her artistic practice entails experimenting with materials and working with metal in order to make objects, installations, body pieces and jewellery (Walker n.d.).

a futuristic approach to 'implantable artefacts' and, according to Zellweger, this enhances "the ambiguity between the autonomous contemporary art object and the applied, historical artefact" (Zellweger 2008: 11- 12). Zellweger's artefacts allow the viewer to engage with a prosthetic object that would usually be unseen, hidden beneath the skin. In comparison to some of his earlier work, these pieces take a literal approach to embodying the prosthetic.

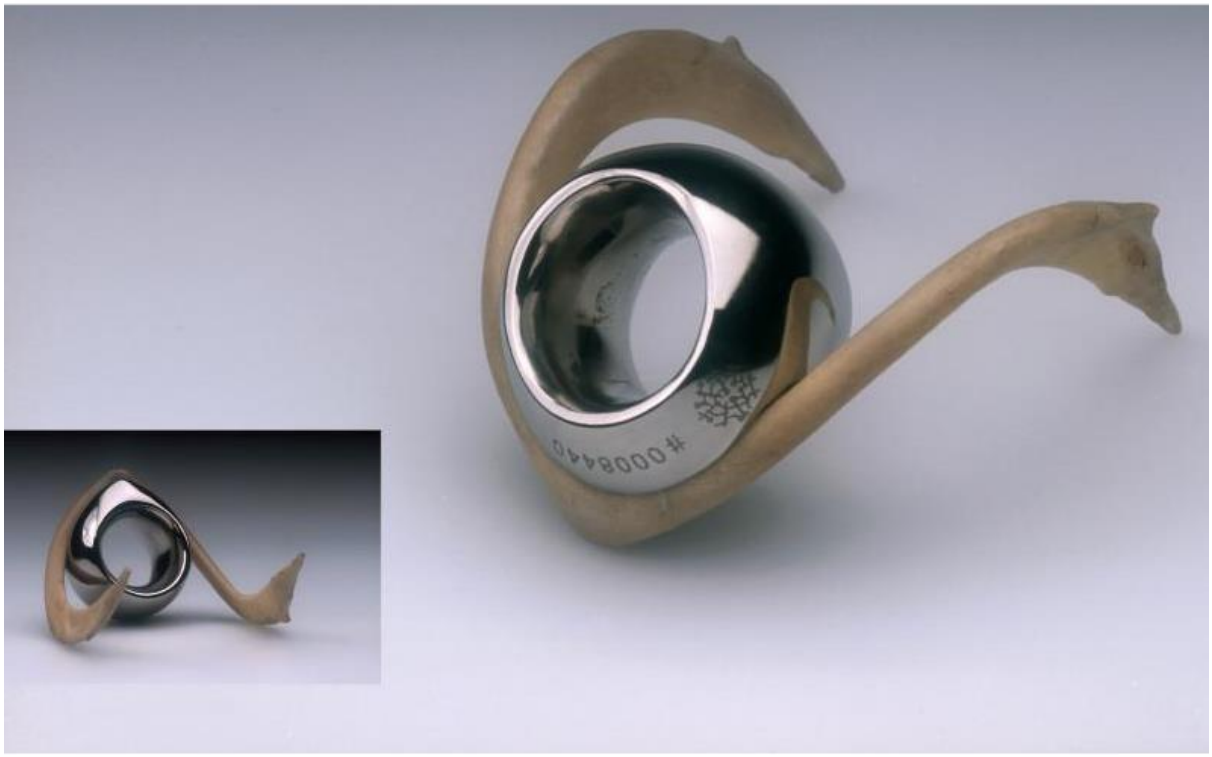

Figure 32: Christoph Zellweger, 2003. Foreign Bodies. Bone, surgical steel. Digital Image. (Source: Zellweger n.d: Online).

Correlating to Zellweger, Walker is an artist whose work obsessively unpacks ideas around the human body. Although her focus is not on technology's role in relation to the human body, Walker's work becomes of interest in the way she positions human skin as a boundary between the human and the environment that has the ability to shift, permeate and break. Furthermore, through its regenerative properties, human skin contains a cycle which becomes vital to the human body (Walker 2017: Online). In some ways Walker's work subconsciously conveys an artificial skin as an organic prosthetic device proximate to the body.

Figure 33: Maria Ignacia Walker, 2017. Flor de Plel. Neckpiece. Resin, Nylon and Gold. Digital Image. (Source: Walker n.d.: Online).

By combining the process of weaving a transparent thread and applying resin drops to tighten the thread, Walker creates a bold cosmos consisting of 'micro-orbs' (resin drops) "dyed with pigments that attach themselves to the thread and are joined together by crochet" (Walker n.d.: Online). These 'micro-orbs' resemble the skin when viewed under a microscope, in that they resemble skin cells which are structured in a similar pattern. Walker's piece (as depicted in Figure 33) becomes a form of artificial tissue that she employs to wrap around the body through various forms. *Flor de Plel* consists of a collection that includes brooches, masks, gloves and neckpieces made from this same process. Through her weaving each piece she engages a figurative process of regeneration, and at the same time illustrating the nature of the human body. Walker's jewellery pieces also rely on the presence of the body to communicate her ideas. I regard her collection *Flor de Plel* as a successful illustration and embodiment of the prosthetic nature of an artificial skin in relation to the human body. Although Walker's pieces do not reference the presence of technology in the transformation of the body, they do focus on the human body as a collaboration of parts, working in unison to establish a whole and functioning body. I interpret Walker's jewellery pieces as prosthetic in relation to the body through the way in which these pieces drape over the body and mimic microscopic aspects of the skin cells. One could even argue that the artificial skin created by Walker

could be regarded as an embodiment of the human technology interface, as it resembles a boundary between the body and its environment. Walker's investigation into the human body and her isolation of human skin as a regenerative organ places skin as an organic mediator for the body through its sensory properties and highlights its role in mediating the body's experience of its' environment (much like the interface).

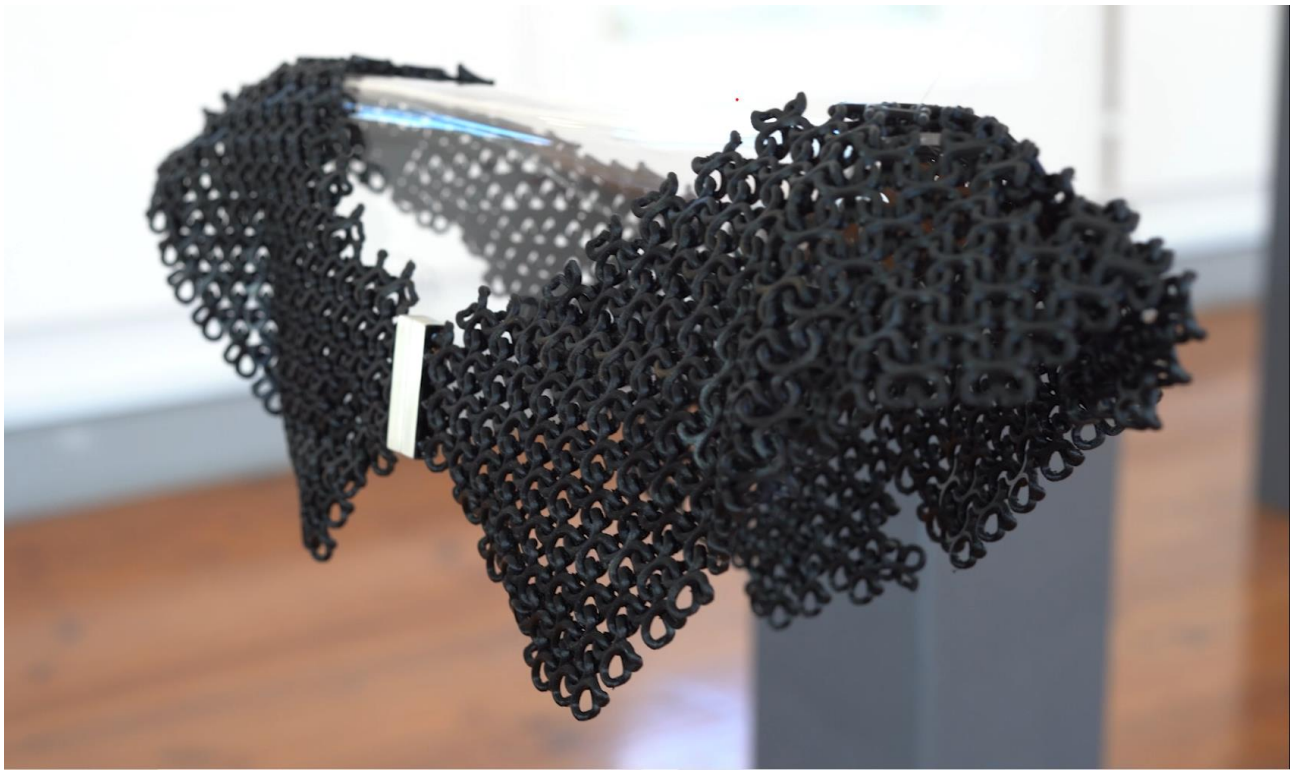

Figure 34: Luché Oberholzer, 2020. Grid #2. Neckpiece. 3D-printed PLA, silver. Digital Image.

Within my series *Grid* (Figure 33) I (much like Walker) explore the notion of an artificial skin. This series consists of various pieces containing 3D-printed links that connect in order to form a movable textile-like material. What began as a 3D interpretation of crocheted links, later transformed into 3D printable chainmail which I incorporated into various jewellery pieces. The aim of this series is to illustrate the impact of the grid as a prosthetic space (digital extension of my body) and its ability to transform, alter and distort natural forms. Additionally, each piece serves as a prosthetic device that, when worn on the body, alters the state of the body, physically as a means of extension and figuratively as a means of becoming integrated into the identity of the wearer. Each link makes reference to the grid found in my virtual studio. Each individual link references a 'block' in the grid, collectively forming a figurative grid. It is also important to note that I consider the grid to be a form of digital prosthesis and extension of my hand to make my jewellery pieces in that the grid signifies the digital space in which I create 3D models. I relate the four viewports of the grid (Figure 1 and Figure 31) to the four walls within my physical studio space. For this reason, I regard the grid as a virtual studio space, an extension of my body (which would otherwise be manufacturing in a physical studio space) into a virtual space. Therefore, not only are these links created through what I argue is a form of digital prosthesis, but they position the body into a now physical grid like structure which

is placed onto the body. Figuratively speaking, the body can then be regarded as an object in the grid, ready to be modelled and transformed. In addition to referencing the grid, these pieces resemble a new skin artificial in nature, but they also redefine the body, by becoming an artificial extension of the skin.

This artificial skin is intended to serve as a prosthetic device in relation to the body (in that it can be regarded as an extension to the skin). The tension between the skin which is warm and soft to the touch, and the artificial skin which (although flexible) is rigid, rough, and cold to the touch references the contrast between organic and machine at the human technology interface. The synthetic skin can be worn on the body; however, I would argue that its artificial nature alters and extends the state of the wearer's body. Additionally, the collaboration of the organic body and artificially manufactured skin creates a connection that references the human and technological boundaries at the *interface*. When worn on the body, this device physically drapes over skin and to the eye reveals only fragments of the organic skin underneath, making reference to the ways in which the boundaries (between human and technology) become increasingly indistinguishable, and arguably illustrating a posthuman state. Collectively this series communicates the role of jewellery as a prosthetic device with the ability to transform the present state of the body into something other. As in the case of Walker's work, my pieces can be seen to cover the body with an artificial presence, distorting the identity of the wearer in some ways. Additionally, these pieces operate as prosthetic devices that change the state of the human body. Although they do not literally enhance or extend the body, these pieces suggest a posthuman state in the way that they interact with the body.

3.5 Conclusion

The aim of this chapter has been to position the role of contemporary jewellery in my art practice as a medium to communicate various discourses around the body. By utilising contemporary jewellery as a medium in my investigation, I establish jewellery as a tool with the ability to extend the body's capabilities. Furthermore, I frame contemporary jewellery as a tool that can construct new identities when placed in relation to the body. Through the wearing of jewellery, the body adopts various new identities, thus assigning a transformative nature to each piece. Considering the transformative properties associated with contemporary jewellery, I establish my contemporary jewellery pieces as technological in nature.

However, in as much as contemporary jewellery is a communicative tool in relation to the body, it becomes the narrator in my research, conveying my deductions in my investigation into the human-technology interface. Although some of my pieces are not literal extensions of the body, they encapsulate prosthetic properties, which can be seen to transform and enhance the wearer both literally and figuratively. By introducing the nature of prostheses as theorised by Marquard Smith and Joanne Morra, I draw a connection between contemporary jewellery and the prosthetic in order to position my own jewellery pieces as prosthetic in nature.

Thus, my work can be regarded as a means to redefine the role of contemporary jewellery in my own practice as presenting an object that visually disrupts the state of the body and assigns new forms of identity. In restructuring jewellery's relationship with the body, I reference a link between jewellery and technology, establishing my jewellery pieces as prosthetic devices. These devices then become objects that in association with the human body communicate aspects of the posthuman state through their prosthetic nature in relation to the human body.

Chapter 4: Posthumanism

4.1 Introduction

In this chapter I introduce the posthuman as a state of being directly influenced by the technological artefact and the ways in which these artefacts become prosthetic devices that aid in the construction of the posthuman state. Considering that posthumanism entails the rejection of traditional Western humanism, I unpack the ways in which the understanding of human being has transcended the confines of humanism, in the sense that the human is no longer regarded as a supreme subjective being (Lamont 1994: 23-24) but rather a co-construct of human, environment and animal (in a posthumanist context). In this regard, I unpack critical posthumanism as a view in which humans co-evolve and share ecosystems, genetic materials and life processes with animals and other life forms (Nayar 2014:8). Furthermore, I outline a clear distinction between posthumanism and transhumanism, in order to motivate my position within a posthumanist framework. By establishing technogenesis as the connection between posthumanism and transhumanism, I discuss the ways in which posthumanist thought informs transhumanism. However, I align transhumanist thought with humanism in that transhumanism positions the enhanced human being as central to the world. Furthermore, I explore the role of technology as a prosthetic device that challenges bodily boundaries at the *interface*, thus establishing what I perceive as the posthuman state. I outline the posthuman state as a co-construction at the *interface*, which becomes activated by human engagement with technology. In this regard, I consider my contemporary jewellery practice as a space in which I can access the *interface* through technological mediation, thus rendering my body into a posthuman state.

I begin the chapter with an overview of the term humanism, drawing on the writings of Tony Davies (1997: 2-10) and Corlis Lamont (1997: 12-13). I introduce humanism as a philosophy informed by science and reason, in which humans occupy a central position in the world (Lamont 1997:13). I then discuss posthumanism by drawing on the work of Francesca Ferrando and Professor Jay David Bolter, alongside that of Pramod Nayar and Katherine Hayles. I introduce posthumanism as a hypernym that presents a "new way of understanding the human subject in relationship to the natural world" (Bolter 2016:1). I focus my understanding of the human in a critical posthumanist context, which suggests that human, machine "and other life forms are now more or less seamlessly articulated, mutually dependent, and co-evolving" (Nayar 2014:8). Furthermore, I establish the role of the human body in the construction of both humanism and critical posthumanism. In introducing humanism as the foundation for posthumanism I reflect on the place of technology in the understanding of human nature. In this regard, I discuss transhumanism alongside posthumanism in order to clearly outline my position in this study. In discussing the cyborg as a transhuman construction, I reference Donna Haraway and Don Ihde. To illustrate what the cyborg means, I draw on the works of cyborg artists Neil Harbisson and Moon Rabis, whom embody the role of the cyborg in transhumanism in that they have technological devices implanted in their bodies. I then introduce body architect Lucy McRae as a means to differentiate between the cyborg and posthuman state; by discussing McRae's work

alongside my own body of work I outline traits central to the posthuman state. Considering the role of technology in transhumanism and posthumanism, I unpack the ways in which the cyborg can be distinguished from the posthuman. I then outline my position in a posthumanist framework, as I unpack the posthuman state with reference to the human-technology *interface*.

In closing, I explain my association with the posthuman by discussing Jane Bennet's 'thing power' (2004: 354) and its relation to object-orientated ontology (OOO). I discuss the ways in which certain objects become invested with forms of power that affect the human's states of being. Therefore, I position the technological artefact as a prosthetic device that informs the posthuman state within the human-technology *interface*. I unpack my creative process in my research thus far and the ways in which it has led to my crafting the digital, by creating various contemporary jewellery devices which act as prosthetic devices transforming and extending my organic body. In unpacking posthumanism, I investigate my own posthuman state and the ways in which the *interface* in relation to the prosthetic subtly transforms my organic body. This chapter introduces the notion of the posthuman as a state of being relative to technological components, which I perceive challenge the body's boundaries at the interface. In the context of this study this means that the posthuman can be regarded as a state in which the human body undergoes transformations that are produced through technological mediation at the human-technology interface.

4.2 Humanism: An overview

In his book *Posthumanism* (2014) Pramod Nayar defines the term 'human' as a subject that is conscious of itself in the sense that the human is a subject that has some form of self-aware intelligence, who can think, and can specifically plan a 'course of action' according to their desires or needs. Nayar suggests that these thoughts lead to various actions and as a result produce a history which features traits such as agency, authority, rationality and autonomy (Nayar 2014: 4). Humanism thus refers to the study of the human subject and the features that comprise the human. By positioning the human subject as central in the world, humanism establishes that "the essence of the human lies in the rational mind, or soul" (Nayar 2014: 4-5). Thus, it is the human subject's ability to process cognitively, accompanied by subjective characteristics, that form the foundation for "all knowledge within humanism" (Nayar 2014: 13). However, "humanism is a word with a very complex history" (Davies 19997:2), in that it encompasses a variety of possible contexts and meanings. In his book *Humanism* (1997), Tony Davies suggests that humanism remains ideologically and conceptually central to modern – perhaps even 'postmodern' – concerns (Davies 1997:5-6). Although humanism began as a "term devised, probably by the educationalist Friedrich Immanuel Niethammer" (Davies 1997: 10) during the early 19th century to describe an educational curriculum that was based on the humanities; "the word was soon taken up by cultural historians" (1997: 10) and embedded in philosophical discourse. Corliss Lamont defines humanism as a philosophy in which "man is the center and sanction" (Lamont 1997:12). In his book, *The philosophy of humanism* (1997), Lamont suggests that

humanism as a philosophy is multifaceted and thus comprised of multiple propositions; however, central to humanism is its devotion to the human as a subjective agent.

Although humanism forms the foundation for our understanding of the human subject, 20th-century philosophy is considered to have undermined the notion of the human by questioning the human as central to the universe (Nayar 2014:11 -12). Michel Foucault similarly questioned the 'so-called sovereignty' of humanism by 'demolishing' "the human subject as the origin of and authority over meaning" (Nayar 2014:13). According to Nayar, "Foucault has rejected the centrality of human cognitive processes in the production of knowledge. What he is calling attention to is the institutional processes, the rules and regimes, the discursive structures within which the human subject develops meaning" (Nayar 2014: 14). According to Foucault, the human subject cannot know him/herself outside the constraints and restrictions of various discourses. This critique and inevitable deconstruction of humanism in the 20th century led to what Nayar refers to as a 'poststructuralist anti-humanism', which would later establish a platform for posthumanism (Nayar 2014 :12 -20). Since "humanity is a species embedded in its technics whose evolution was already technological" (Miccoli in Weiss, Propen and Reid 2014: 6), it is important to note humanism's role in establishing a platform where the human subject could be investigated further in relation to its environment as well as other surrounding discourses.

4.2 Critical Posthumanism

The term posthumanism can be regarded as a hypernym which includes several movements in philosophy such as critical posthumanism, transhumanism, new materialism and antihumanism, to name a few (Ferrando 2013:26). Central to posthumanist thought is the intention to "undermine the traditional boundaries between the human, the animal, and the technological" (Bolter 2016:1). Posthumanism is regarded as a "rejection of traditional western humanism" (Bolter 2016:1), in that it positions the human as an agent that is mutually dependent upon certain eco-systems, genetic material and life processes within the environment, and other life forms (Nayar 2014:8). Within the parameters of this study, I position my investigation in a posthumanist framework whilst drawing on aspects of transhumanism to outline what I perceive as the posthuman state.

According to Pramod Nayar (2014), the central objective of critical posthumanism draws attention to the idea that the human body and machine[58] are "seamlessly articulated, mutually dependent, and co-evolving" (Nayar 2014 :8), while regarding technology as integral to human identity and not merely a prosthetic extension. This notion is implemented through a rejection of human exceptionalism and human instrumentalism (Nayar 2014:8). In this regard, critical posthumanism references characteristics that are central to the process of technogenesis, in that it draws attention to the co-evolution and co-construction of human, environment, animal and technology.

[58] 'Machine' in this case refers to technology or mechanised instruments and tools - a man-made device that does not originate from the human body.

Considering that this study positions technogenesis as foundational in the understanding of the human-technology *interface*, I would argue that critical posthumanism is most applicable in unpacking the complexities of bodily boundaries at the *interface.* However, it is important to distinguish this perspective from transhumanist thought, as there is much confusion in the space which posthumanism and transhumanism share. In the following sub-section I outline the nature of transhumanism by discussing the ways in which posthumanism informs transhumanist thought in order to distinguish the effects of posthumanism in the construction of the cyborg and what I perceive to be the posthuman state.

4.2.1 Transhumanism

According to Pramod Nayar, transhumanism views the human in relation to its environment, acknowledging that technology is a means by which the human body can be improved either by adding to the body or replacing something that is missing (Nayar 2014: 6). Nayar goes on to explain that transhumanism focuses on the human body's limitations and aims to transcend these limitations, hoping to achieve the 'perfect'[59] human body. The human becomes "an intermediate stage before the arrival of the advanced human" (Nayar 2014 :6). Francesca Ferrando adds to this by explaining that "transhumanism problematizes the current understanding of human not necessarily by its past and present legacies, but through the possibilities inscribed within its possible biological and technological evolutions" (Ferrando 2013:27). In the light of these evolutionary possibilities technology is central to the transhumanist perspective in that "technology becomes a hierarchical project, based on rational thought, driven towards progression (Ferrando 2013: 28). In other words, transhumanism exemplifies a reconstructed human enhanced by technology.

Although there are similarities between the philosophies of posthumanism and transhumanism, I deduce that in many ways transhumanism contrasts with the ideas around posthumanism. However, posthumanism and transhumanism remain connected by their strong association with technogenesis (Ferrando 2013:28), specifically with regards to the role of technology as a transformative device. The confusion, however, between these two perspectives appears through the way in which both transhumanism and posthumanism "approach the same subject from different standpoints and theoretical legacies" (Ferrando 2013:29). Ferrando suggests that the principal distinction between posthumanism and transhumanism is that "posthumanism investigates technology precisely as a mode of revealing" (Ferrando 2013:29) and therefore "posthumanism is a praxis" (2013:29) that informs transhumanist thought, while transhumanism is regarded as a subset theory that resides within the hypernym of posthumanism, and it specifically utilises technology as an object of enhancement (Nayar:2014:7). Therefore, transhumanism draws on various aspects of a posthumanist view, yet it applies alternative methods in its approach to technology.

[59] Perfection in this sense refers to bodies that are disease free, more intelligent and longer-living (Nayar 2014:6).

In this study I focus on a posthumanist view, centralising my understanding of my own body in Nayar's description of the critical posthuman. My discussion of technology thus far has indicated that there is a clear distinction between my own experience with the technologies that I engage and Nayar's explanation in his book. It has been my aim throughout my research to introduce the notion that the technologies I engage with and me are 'mutually dependent', that various tools have become 'seamlessly articulated' with my own body, and that evidently, I find myself co-evolving alongside these tools (technogenesis). Furthermore, I regard technology as an inherent part of human existence and I contend that this relationship will continue to advance into the future. Technology can therefore be viewed as a means to redesign humanity, and this will inevitably lead humans to "a virtually immortal posthuman future" (Doede 2009: 45).

4.2.2 Posthumanism

According to Hayles, the notion of the posthuman was introduced as early as the 1950s by the work of Norbert Wiener, who suggested the possibility of telegraphing a human by theoretically "transmitting a living organism such as a human being" (Wiener 1989: 103). Additionally, the producers of *Star Trek* explored similar premises as they "imagine that the body can be dematerialized into an informational pattern and rematerialized, without change, at a remote location" (teleportation) (Hayles 1999: 1). In her book *How we become posthuman* published in 1999, Katherine Hayles discusses posthumanist thought and the ways in which humanism has begun to transform. According to Hayles, 'the human form' is radically changing and these changes must be 're-visioned' into what we know as the posthuman (Hayles 1999: 1). Hayles's investigation into the history of cybernetics led to what she explains as three interrelated stories. The first is centred on the way information has become "disembodied" (Hayles 1999:2) and can thus be conceptualised as a separate material entity. The second concerns the way the cyborg has been 'created as a technological artefact and cultural icon'. The third, which Hayles believes is 'deeply implicated' in the first two, presents the construction of the posthuman (Hayles 1999: 2). The connection between these three narratives is best explained in her own words:

> Interrelations between the three stories are extensive. Central to the construction of the cyborg are informational pathways connecting the organic body to its prosthetic extensions. This presumes a conception of information as a (disembodied) entity that can flow between carbon-based organic components and silicon-based electronic components to make protein and silicon operate as a single system. When information loses its body, equating humans and computers is especially easy, for the materiality in which the thinking mind is instantiated appears incidental to its essential nature. (Hayles 1999:2)

Hayles's explanation captures the composition of the posthuman, which she presents as a combination of organic and artificial body parts. More importantly, she introduces the role of the prosthetic in constructing the posthuman, or as I refer to it, the posthuman state. Central to the theme of posthumanism is the idea that the human body is

the first form of prosthesis and that by adding to it with other artificial objects we are merely continuing the process initiated before birth (Hayles 1999: 3). Hayles's description of the posthuman strongly relates to Donna Haraway's definition of the cyborg, in that technology is regarded as possessing prosthetic qualities that can transform the human body. In her *Cyborg Manifesto* (1991) Donna Harraway "treats the human as a hybrid of machines and the organic body, thus marking an end to the idea of the sovereign human individual" (Nayar 2014: 21 -2). Harraway considers the human subject to have evolved alongside various machines and argues that separating the two would be to invalidate the co-dependency that exists between human and machine. Thus, Harraway introduces the notion of the 'cyborg' as "a liminal creature, between human and the machine, neither human nor machine, both human and machine" (Nayar 2014:22).

In the light of this definition of the cyborg, it is important to note that I do not regard technology as a prosthetic enhancement in a transhumanist sense, as central to the cyborg, but rather in a posthumanist sense. I relate to technology through its ability to inform my decision making in the process of making contemporary jewellery. Therefore, my relationship with technology is informed by technological mediation, in the sense that my collaboration with my tools results in what I perceive to be a co-evolution of human and technology. It is also important to note that at the *interface* I embrace a posthumanist perspective: I do not position myself above technology, but instead recognise my dependency on my tools whereby I facilitate a co-construction of the human and technology. To unpack my own human-technology *interface* within a posthumanist context, I draw on Katherine Hayles's definition of the posthuman, which she defines as "a coupling with intelligent machines but a coupling so intense and multifaceted that it is no longer possible to distinguish meaningfully between the biological organism and the informational circuits in which the organism is enmeshed" (Hayles in Nayar 2014:7).

4.3 Posthuman State

Although this notion of reconstructing the human body may seem somewhat threatening to the human condition, it is unlikely that it signals the end of humanity but instead transforms conceptions of the human body (Hayles 1999: 286). According to Hayles, posthumanism offers a new way of thinking about virtual technologies, for as long as the human self is considered an autonomous subject with explicit boundaries, the human-technology interface must be viewed as a space where there is distinct division between real life and an illusion of virtual reality. Posthumanism is not a departure from the human body but rather an extending of 'embodied awareness' through prosthesis (Hayles 1999:290 - 291). In the light of this, the role of the prosthetic becomes crucial to the way I view my body from a posthumanist perspective. Additionally, Harraway's definition of the cyborg, alongside Hayles's and Nayar's discussion of the posthuman, prompts me to reflect on the nature of the human body in relation to its environment and the technologies available to it from a posthumanist perspective.

In discussing the posthuman state I reference Pramod Nayar, in that he describes the posthuman as a 'dynamic hybrid', formed through the mutual exchange between humans and their environment (Nayar 2014 : 8-9). The posthuman state represents the human body as a combination of the organic body with the 'non-human and machine', which shifts our thinking from the subjective human body (humanism) to a body that is considered "less as a bounded entity than as a network of assemblage, evolving with technology and then environment" (2014: 64). Within the parameters of this study, I consider posthumanism to foster the idea of a combination/ hybrid of human and technology in some form, which may resonate with Harraway's definition of the cyborg. However, my perspective on the posthuman state does not necessarily embody the cyborg as much as it draws upon what Hayles and Nayar explain as an exchange, extension and co-evolution of the human and technology.

To illustrate my own differentiation[60] between cyborg and the posthuman state, I reference artists Neil Harbisson, Moon Ribas and Lucy McRae. In discussing their work alongside my own body of work I aim to make a clear visual distinction between the cyborg body and the posthuman body. Harbisson and Ribas are classified as cyborg artists and together they have established a cyborg foundation which advocates for humans physically transitioning to cyborgs (Cyborg Foundation 2020: Online). In an interview with Harbisson and Ribas conducted at the 2019 Design Indaba Conference, Taahirah Martin addresses the issue of the cyborg artists and their artistic views. Neil Harbisson (Figure 35) identifies as a colourologist and cyborg artist. Harbisson who is naturally colour blind, implanted a custom-designed antenna into his skull which "allows him to perceive visible and invisible colours via audible vibrations in his skull" (Cyborgarts 2020: Online). Moon Ribas (Figure 36), who is a close companion of Harbisson's, also identifies as a cyborg artist as well as an avant-garde artist. Ribas is best known for the seismic sensors that are implanted in her feet. These sensors allow her to "perceive earthquakes taking place anywhere on the planet through vibrations in real time" (Cyborgarts 2020: Online); Ribas then translates these vibrations through sound or dance.[61]

[60] Although I differentiate between the cyborg and posthuman body in my research, I do so only to illustrate how I process these two terms. In theory the cyborg body may reside within what is known as the posthuman body, but for the purpose of this study I have chosen to separate them mainly because the cyborg has certain cultural associations attached to it which do not resonate with my research.

[61] Moon Ribas's & Neil Harbisson's performances can be viewed online at www.cyborgarts.com.

Figure 35: Cyborg Arts, 2020. Image of Neil Harbisson. Digital Image. (Source: Digitalarts 2020: Online).

Figure 36: Cyborg Arts, 2020. Image of Moon Ribas. Digital Image. (Source: Digitalarts 2020: Online).

According to Harbisson, "the difference between using and wearing technology is that if you merge with technology you don't feel like [you are actually] using it. When you use it as a tool you are conscious that you are using it" (Martin 2019: Online). Although I can understand and relate to Harbisson's views on the physical process of merging with technology, I would argue that one can merge with technology virtually and subconsciously as well. Considering that Harbisson's antenna and Moon's seismic sensors are also technological tools that enable them to experience their environment differently, the question arises as to whether what they define as cyborg could be considered posthuman as well? The prime difference would then be the mere fact that Harbisson and Moon consider these tools to be new 'body parts' which (for them) cannot be differentiated as non-human. However, it is evident from their interview that they do not actually consider themselves to be merely human, but that as a

result of these additional technological parts embedded in their organic bodies, they have now begun to transition into a new life form known as a cyborg.

In introducing the notion of the posthuman state I reference artist Lucy McRae, who I argue, illustrates the notion of the posthuman state by her artwork's ability to challenge the ways in which technology transforms the human body. According to her website, she identifies as an artist, inventor, filmmaker and a body architect. Her work ranges from installation, edible technology, artificial intelligence (AI) to installation, photography and film. In her work she explores the limitations of the human "body, beauty, biotechnology, and the self" (McRae n.d.: Online), while investigating both the emotional and cultural impacts technology has on the transformation of the human body. More specifically, McRae "uses art as a mechanism to signal and provoke our ideologies and ethics about who we are and where we are headed" (McRae n.d.: Online). Although McRae is not a contemporary jewellery artist, her work has been largely influential in this study.

Figure 37: Lucy McRae, 2019-2020. Body Architect. Exhibition. Digital Image. (Source: McRae n.d: Online).

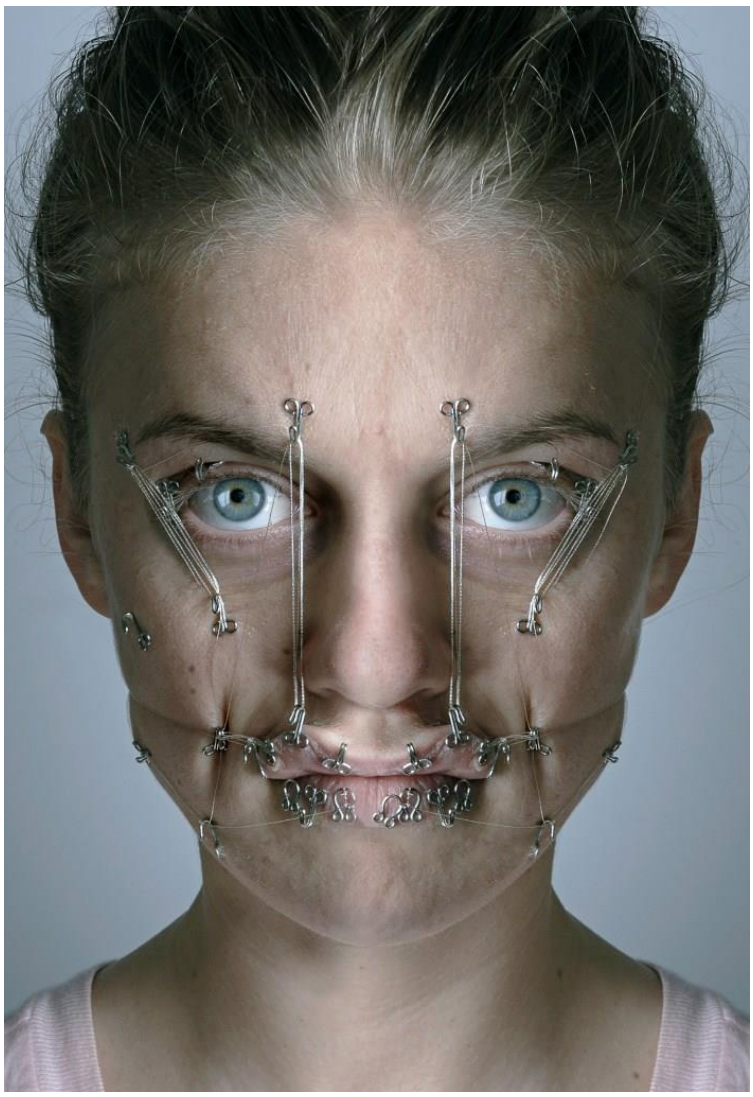

Figure 38: Lucy McRae, 2019-2020. Hook and eyes. Body Architect Exhibition. Digital Image. (Source: The design writer 2021: Online).

One of her most recent exhibitions, *Body Architect*[62] (Figure 37), expands on how technology transforms the human body, as she interprets the human body as a tool in her artwork, by combining technology and biology to illustrate "the reconstruction of the body and its skin" (Aydin 2018: 66). *Body Architect* illustrates various images of "augmented bodies and wild flights of biological fancy to an algorithm that makes your face 'perfect'" (McRae n.d.: Online). McRae's collection contains a diverse set of images and films depicting the ways in which technology can possibly alter the human body in the future. I would argue that McRae's work personifies the posthuman state,

[62] *Body Architect* is a recent exhibition curated by Simone LeAmon and Hugh Williamson featuring more than a decade's collection of works produced by Lucy McRae. This exhibition took place at the National Gallery of Victoria (NGV) in Australia during the later part of 2019 and early 2020; it is currently available to explore virtually on NGV's website. The exhibition includes a variety of digital images and films which illustrate McRae's investigation into the human relationship with technology.

in that her work challenges our understanding of the bodily boundaries in the working of the human-technology interface. The exhibition is comprised of a collection of films, installations, various devices and photographs that evoke questions about human existence in a digital age. According to McRae, her work is informed by science and technology, and generates speculative stories that question the ways in which scientific progress will affect the human body. The human body is central to her work in that she unpacks the body's boundaries in relation to technology. In an online interview conducted by the organisation *Dezeen* in 2020, McRae states that during her process of making she aims to investigate her emotions, feelings and what can be regarded as a response to her state in that process where the output of her making process becomes a physical manifestation of her emotions and state in that space. McRae goes on to say that in her work, the human and machine become integrated in that the one activates the other (McRae 2020). In the light of McRae's discussion of her work, I draw a connection to my own investigation into the human-technology *interface,* in that I regard McRae's work to similarly apply a posthumanist perspective specifically in relation to technogenesis, in the sense that her work unpacks the ways in which humans would speculatively evolve alongside the unprecedented changes in the current digital landscape. Like McRae's, my process of making informs my artistic output which positions the process of making as central to the investigation into the human-technology *interface.*

McRae's collection of facial devices (illustrated in Figure 38) that adjust and transform the human face are of particular interest to me in my research. These devices stem from an exploration into the ways that technology can 'perfect' the human body through various rituals that alter the natural facial autonomy. This notion of perfection resonates with transhumanist culture; however, these devices also embody prosthetic properties in the ways that they alter or extend the organic human body. McRae's work has a strong connection to the ways in which the current technological environment affects the human body. She captures this within her artwork by incorporating materials and techniques that relate to the current digitalised landscape, which arguably renders her work more relatable to an audience in the current digital age. Like McRae, I become influenced by my technological environment and the ways in which it alters my experience of making. As a result, most of my work encompasses a direct connection to the technological presence within my art practice. My series *Digi-print* (illustrated in Figure 39 - 41) demonstrates the blurring of the boundary between human and technology by inviting the wearer/viewer to interact with virtual jewellery pieces through an augmented reality.

This series is comprised of five jewellery pieces that originate from my design exploration exercise discussed earlier (on pages 60 – 65). Although these pieces were initially 3D printed and manufactured to illustrate my design process; they were converted into virtual pieces by rendering the 3D model and assigning certain materials and textures to a selection of them. Once the 3D model is rendered successfully, they are then exported in a drawing interchange format (DXF) which enables the data assigned to each model to be read and understood by other programs. Each piece is then imported into an online augmented reality platform where they are each assigned quick response (QR) codes that can be scanned by most smart devices. The concept behind this series is to

create an interactive experience through augmented reality (AR), by inviting the viewer to engage with the jewellery pieces using their own smart devices.[63] When the smart device scans the QR code, it activates the code and automatically directs the viewer to a link in their browser (Figure 39), which loads an image of the piece and provides the option to view the piece through an augmented reality.[64] Once the viewer selects the option to 'view in AR', it activates the camera on the smart device and the piece is projected onto the screen of the smart device by way of 'intelligent display technology' (Chen et al 2019: 2). The viewer can then manipulate the piece by scaling it and positioning it either within a space or on the body, which can be seen through display on their smart phone. This is best illustrated in Figure 40, which illustrates screenshots taken by viewers who interacted with these 3D models in various ways.

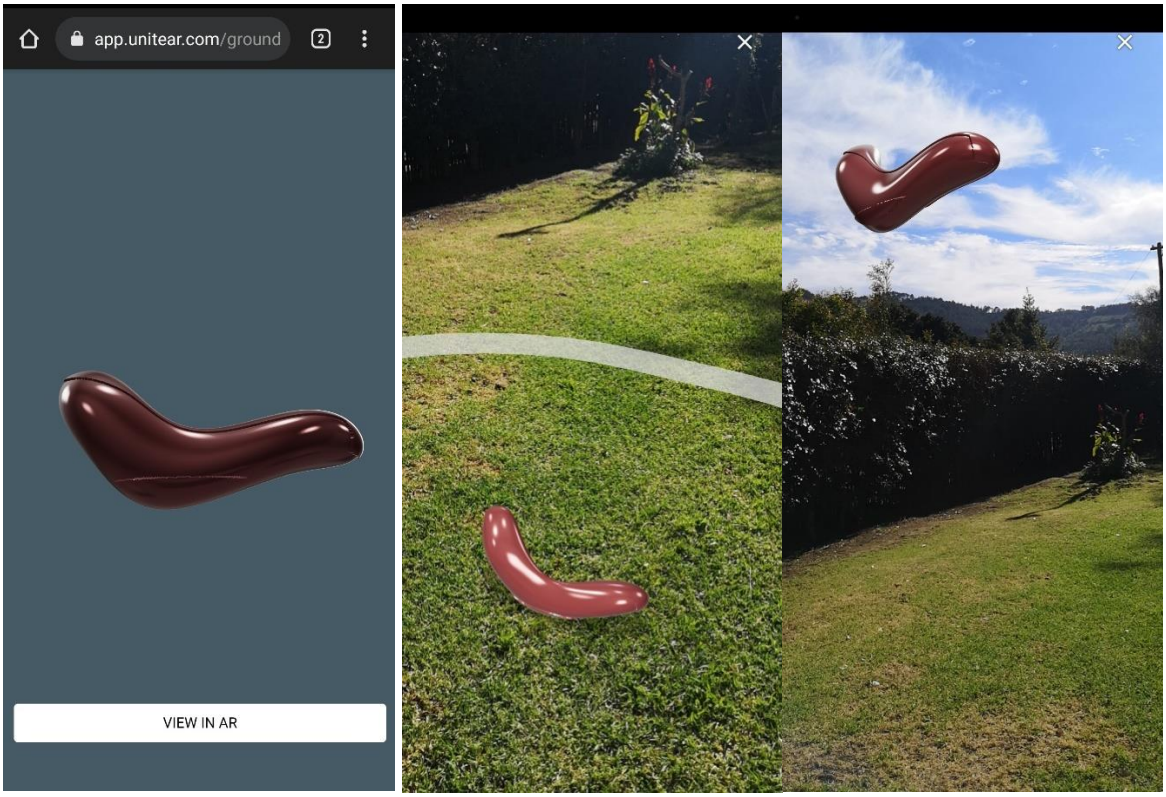

Figure 39: Luché Oberholzer, 2021. Screenshot capturing the process of loading and placing *Digi-print #1* into a space.

[63] The viewer can activate the QR code easily via the camera on their smart phone. However, any device that has a camera with a QR scanner, or an application that allows them to scan a QR code will be able to activate the code accordingly.

[64] The technical process of AR technology is best explained by Yunqiang Chen and his colleagues, Qing Wang, Hong Chen, Xiaoyu Song, Hui Tang, and Mengxiao Tian from the college of information and electrical engineering in Beijing. In their publication Chen et al present an overview of augmented reality (AR) in which they discuss 3D registration technology. They introduce 3D registration technology "as one of the most critical technologies in the augmented reality system" (Chen et al 2019: 2) and go on to say that "3D registration technology enables virtual images to be superimposed accurately in the real environment. The main flow of 3D registration technology has two steps. First, determine the relationship between the virtual image, the model and the direction and position information of the camera or display device. Second, the virtual rendered image and model are accurately projected into the real environment, so the virtual image and model can be merged with the real environment" (Chen et al 2019: 2-3).

What becomes interesting in analysing these images, is the various interactions with these pieces. Although I created this series as virtual jewellery pieces that are supposed to be projected onto the body, viewers manipulated these pieces by projecting them into a space first and only later began to place the pieces onto the body[65]. The augmented reality space becomes a personification of the posthuman state in its ability to merge human and technology through a technological interface.

Figure 40: Luché Oberholzer, 2021. Screenshots of viewers wearing *Digi-print #3* and *#5*.

[65] Interacting with these pieces through a smart device and more specifically a smart phone initiates an interesting association with the prosthetic nature of smart phones. In many ways, the smart phone has become a somewhat obvious extension to the human, whether it is to direct you to a specific location via a guided positioning system (GPS), to capture images of special moments, to contact someone with a two-hour time difference halfway across the world, or to make payments via a banking app (to name a few), the smart phone is arguably now one of the most common extensions of the human body. In this regard the smart phone becomes a significant mediator for the viewer's augmented reality (AR) experience with the *Digi-print* series. I would argue that these experiences can be read as posthuman interactions with the human-technology interface, in that the viewer is accessing these jewellery pieces through an extension of themselves (the smart phone). The smart phone not only becomes an extension of the human body but also enables the viewer to bridge a boundary of the body into the technological by accessing a space which displays virtualised bodies and jewellery pieces.

Figure 41: Luché Oberholzer, 2021. Screenshot capturing the testing of the *Digi-print* series.

My understanding of the posthuman state is focused on a combination of Jane Bennet's 'thing power' and Neil Leach's discussion on objects-orientated ontology (OOO). In her essay *The force of things: steps toward an oncology of matter* (2004), Bennet discusses the ways in which certain objects become invested with power. Bennet explains 'thing power' as containing relational effects, which represent multiple functions that operate in unison. She goes on to say that these functions enable the human to shift from one state of being to another (Bennet 2004: 354). This pertains to the human interaction with a smart device which inherently represents multiple functions that can operate individually or in unison that could arguably 'shift' our human bodies from one state to another depending on our interaction. Similarly, Neil Leach's discussion on object-orientated ontology (OOO) positions objects as devices that possess agency. Leach outlines OOO as the understanding that accommodates the tool and presents the ability to think through the tool, rendering the tool as a prosthetic device in relation to the body (Leach 2016: 346), which again relates to the human's interaction with smart device's.

In the light of Leach's discussion on OOO I draw a connection between Bennet's discussion of 'thing power' and Leach's discussion of objects as prosthetic in nature. Leach's suggestion that humans "appropriate technology and tools and tend to absorb technology within human consciousness" (Leach 2016: 346) informs my

understanding of technology in relation to the human body. By combining this perspective with Bennet's 'thing power', I argue that humans with their ability to absorb technology into their consciousness, draw on this 'thing power' that can be embedded within technology. This becomes evident in the interactions around my *Digi-print* series. As viewers interact with these pieces using a smart device, they demonstrate the ways in which technology becomes appropriated and forms a part of the their abilities by extending the human's physical and cognitive abilities in various ways. More so, these devices possess the ability to shift the state of the body (especially the state of mind) from a physical to a virtual space. In this regard, technology when presented as an extension to the body can generate a posthuman state by presenting a platform (interface) on which human and technology can collaborate.

Similar to the outcome that *the Digi*-print series initiated, I position my own process of making as having the ability to generate the *interface* which enables a posthuman state by constructing a platform for human and technology to collaborate. Although I do not necessarily implant certain aspects of technology into my body, I am aware of the ways in which technology transforms my body. When using a tool or engaging with technology, I have found (as mentioned in my previous chapters) that my mind engages with the material as the tool operates which enables a series of cognitive exchanges between myself and the tools that I use. In discussing technological bodies (Chapter 1) and the role of technogenesis in my practice, I have elaborated on the ways I engage with various tools and how they lead my design process through both action and thought. Although my tools do not physically merge with my organic body, I would argue that they reside within the space closest to my body where they figuratively merge into my body's cognitive understanding of itself. Furthermore, I establish the technologies that I engage as tools that can mediate human experience, while also acting as prosthetic devices that can enhance or alter the human body. Specific to my own body, I view the technologies I engage and the jewellery pieces that I create as devices that shift my body into a posthuman state. The effects that lead towards a posthumanist view of my own body in relation to the tools I use are not necessarily always tangible, but remain subtle and embedded in my mind as I engage with technology. I explore the posthuman state further in my contemporary jewellery practice by submerging myself within my own human-technology *interface*, deliberately engaging with various digital and nondigital technologies in order to analyse its effects on my cognitive and physical abilities. During the process of making, I confront my own posthuman self in relation to the technologies that mediate this experience in my contemporary jewellery practice. The act of wearing and interacting with my jewellery pieces enables a secondary experience that is initiated for the wearer/viewer in which they are invited to engage with my own subjective experience which is embedded in each piece. Therefore, my body of work which is comprised of jewellery pieces, installations, films, sculptures and virtual jewellery pieces becomes a translation of the indistinguishable boundaries that are present within my own human-technology *interface*.

4.5 Conclusion

The aim of this chapter has been to provide an overview of humanism in order to introduce posthumanism as a means to understand and unpack the posthuman as a state of being. By interrogating aspects of human nature and its ability to transform and adapt alongside technology, I establish a platform from which the state of the human body can transcend humanism into posthumanism. In this regard, the technological artefact is regarded as a transformative device that enables my body to enter into a posthumanist state in the process of interacting with technologies in the form of tools (be they digital or nondigital) as well as jewellery pieces (with specific reference to the jewellery pieces that I create with my engagement through such tools). By outlining the prosthetic nature of technology in relation to the body, I introduce the posthuman state as a hybrid of organic and synthetic properties.

By establishing technology as tool of mediation in relation to human experience, I investigate the role of the cyborg and the posthuman within the context of posthumanism. The discussions of posthumanism by Jay David Bolter and Francesca Ferrando, Ramod Nayar and Katherine Hayles provide the basis for the view that technology has the ability to challenge the body's boundaries within the human-technology interface. Furthermore, Jane Bennet's discussion of 'thing power' alongside Neil Leach's explanation of prosthetic objects provides a theoretical illustration of the posthuman state. The posthuman state in relation the *interface* can be regarded as a state in which the human body undergoes technological transformations through co-construction by the human and the technological. I consider my own body as interacting with this state during the process of making; however, this state cannot be rendered permanent in that I can access or leave the *interface* at will. I regard posthumanism as a transcended state of the human body in that it is an artificially engineered state that is manifested in my research as I investigate my own human-technology *interface*.

And as such I consider posthumanism as a state of being within the boundaries of the interface. This state of being represents my body's destination as it continuously transforms under the influence of technology. Additionally, it redefines technology as a prosthetic device translating these extensions of the human body into artificial body parts. As I reconsider the state of my own body in relation to the technology I engage in my contemporary jewellery practice, I am faced with a new self. This transforms my understanding of my body and my mental capabilities as they shift from biological to artificial. By discussing the works of cyborg artists Neil Harbisson, Moon Ribas and body architect Lucy McRae, I illustrated the ways in which the posthuman is portrayed and manifested. Additionally, my own work resembles posthuman fragments extracted throughout my investigation into my own human-technology *interface*. Thus, when unpacking my investigation, I am faced with the inevitable fact that my body is the location where technology and biology intersect. In the process of obscuring the boundaries of not only my own body but also the technologies that I rely on, I transform my body into a posthuman state.

Conclusion

My investigation into the human-technology interface is informed by an exploration of the role of technology as a mediator within my creative process and serves to outline my own subjective experience around technological interactions within my practice. This thesis serves as the theoretical component of a practice-based investigation into the human-technology interface in my contemporary jewellery praxis. By interrogating the ways in which I engage with my tools in the process of making contemporary jewellery, I unpack the influence of technogenesis within the framework of developing of technologies (in relation to the human body), whilst positioning technology as a prosthetic device that can assist in diffusing the boundaries of my own body. In this regard, I investigate the possibility of my own body assuming a posthuman state during the process of making.

The first chapter places the process of technogenesis at the foreground of technological development and human advancement. By unpacking the influences of the industrial revolutions and the construction of the industrial artisan, I explain the extent to which technology has transformed our current understanding of craft. This chapter also explains the role of the re-tooled object, positioning it as a catalyst for conceptual technogenesis through which artists can apply various alterations and transformations in their creative processes. This foregrounds the way that humans and technology co-evolve though the process of technogenesis. Furthermore, it discusses technological bodies and the prosthetic nature of technology in relation to the human body, thus establishing a foundational concept for my investigation into my own human-technology *interface*.

Chapter 2 outlines postphenomenology as a theoretical framework in my investigation, while establishing the interface as a transformative space where human-technology boundaries become increasingly indistinguishable. By utilising postphenomenology as an investigative lens, this chapter investigates and unpacks the human-technology interface in a contemporary jewellery practice. Furthermore, it explains the phenomenological attributes and ontological properties of objects and it positions technological objects as mediators in the construction of human consciousness. Therefore, this chapter explains the prosthetic nature of technological objects as they transform both themselves and the human body at various interfaces.

Chapter 3 examines the role of contemporary jewellery as an enacted process in my investigation by positioning contemporary jewellery as a tool (within the context of technogenesis) with the ability to extend and enhance the human body. By providing an overview of contemporary jewellery and its ability to construct identities, I outline the significance of contemporary jewellery as having the ability to embody various forms of symbolism by positing my jewellery pieces as tools both literally and figuratively. I explore the notion of contemporary jewellery as technology by positioning my own jewellery pieces as technological devices and introducing them as techno-jewellery pieces. By providing an overview of the prosthetic device and its relationship to the human body, I confront the notion that these techno-jewellery pieces extend my body at the human-technology *interface*.

Chapter 4 introduces posthumanism as a means to outline the notion of the posthuman state. By interrogating aspects of my own human nature and its ability to transform alongside technology, I establish a platform from which the body can transcend its boundaries and enter into a posthuman state. In addition, I discuss the prosthetic nature of technology in relation to the body and the ways in which technology can extend the body's physical and cognitive abilities. In doing so, I establish the posthuman state as a hybrid of organic and synthetic systems. Furthermore, this chapter outlines the posthuman state as an artificially engineered state that manifests the workings of the interface, by regarding the technological artefact as a transformative device that enables the body to enter into this state.

By investigating my own human-technology *interface* in the process of making, I become increasingly aware of the role of technology as a mediator in my practice. In the act of making contemporary jewellery pieces, technology subtly informs the ways in which I engage with the material and largely influences my manufacturing processes. The transformative characteristics embedded in my tools become increasingly tangible by investigating the human-technology *interfaces* within my practice. Although the *interface* signifies an intangible transformative space, contemporary jewellery can be utilised as a successful medium by which I can illustrate the effects that my body and my tools undergo within this space. My jewellery pieces become a communicative tool by means of which I illustrate posthumanist discourse, and in doing so I become increasingly aware of my posthuman state. This awareness enables me to understand my technological interactions and utilise them within my creative process. Contrary to my initial experience of being dependent on technology, my investigation has led me to embrace my tools as devices that collaborate with and extend my bodily abilities while making. It is this process of collaboration and extension that I argue renders my tools prosthetic in relation to my body.

Although this study focuses on the influence of technology in a craft environment, I consider technological mediation to exist outside of my craft as well. As society continues to evolve alongside technology, the process of technogenesis becomes prevalent in the current digital landscape. The present integration of technologies enables a near seamless interaction between human and technology which could lead to the rapid development of merging technologies, mainly within the field of artificial intelligence (AI). In this regard, the boundary between the technological and the human could fade entirely, which may potentially result in a future where technology identifies as 'self' and no longer a device. This presents an interesting narrative for the future, in that the posthuman state seems an inevitable destination in the digital landscape that comprises the current fourth industrial revolution.

In conclusion, it is evident that the role of technology within my artistic practice predominantly mediates my experiences of making contemporary jewellery. This process has allowed a more comprehensive understanding of my own bodily boundaries at the various human-technology *interfaces* within my practice. Examining the ways in which my tools have evolved historically enables me to utilise the process of technogenesis within my practice

and generate new technological engagements. This understanding alleviates tensions related to technology as an overpowering presence and further empowers me to embrace technology as a collaborative tool by means of which I can continue to develop various tools, mediums and materials in my contemporary jewellery praxis.

Figures

Figure 42: Luché Oberholzer, 2019. Techne 1. Pendant. Oxidised Silver, PLA, coated copper wire, tiger tail.

Figure 43: Luché Oberholzer, 2019. Techne 2. Brooch. Enamel, copper, coated copper wire, silver.

Figure 44: Luché Oberholzer, 2019. Techne 3. Object. Oxidised silver, PLA.

Figure 45: Luché Oberholzer, 2019. Techne 4. Pendants. Oxidised silver, PLA, tige rtail.

Figure 46: Luché Oberholzer, 2019. Techne 4. Pendants. Oxidised silver, PLA, tiger tail.

Figure 47: Luché Oberholzer, 2020. Industrial Artisan 1. Pendant. 3D printed PLA, oxidised silver, coated copper wire, and leather cord. Digital Image.

Figure 48: Luché Oberholzer, 2020. Industrial Artisan 2. Pendant. 3D-printed PLA, oxidised silver, coated copper wire and leather cord. Digital Image.

Figure 49: Luché Oberholzer, 2021. Hybrid 4. Brooch. Enamel paint, silver, PLA, coated copper wire, resin.

Figure 50: Luché Oberholzer, 2021. Hybrid 5. Pendant. Enamel paint, silver, PLA, coated copper wire, leather cord.

Figure 51: Luché Oberholzer, 2020. Mesh Loading 1. Collar. Enamel-coated steel wire, PLA.

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Addendum

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